

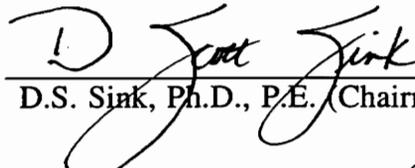
A Formative Evaluation of the Gainsharing System of a Small, Public-Sector, Research & Development Organization

by
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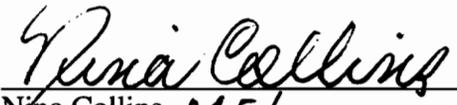
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**A FORMATIVE EVALUATION OF THE GAINSHARING SYSTEM OF A
SMALL, PUBLIC-SECTOR, RESEARCH AND DEVELOPMENT
ORGANIZATION**

by

Robert Osmond

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(ABSTRACT)

Gainsharing plans have been in existence since the late 1930s when the Scanlon Plan was implemented by Joseph Scanlon at the Empire Steel and Tin Plate Company of Cleveland. Since that first implementation, gainsharing has spread to encompass 15% of American corporations with over 500 employees (N.Y.S.E., 1982 cited in Gowen, 1990).

Changemasters, Inc. (CMI) is a small, public-sector, research and development organization. CMI has had a gainsharing system in place since 1987. Over the years CMI's gainsharing system has been altered and modified to incorporate the experiential learnings in the areas of motivation, compensation management, and gainsharing. This study documented the evolution of CMI's gainsharing system and evaluated it to determine whether or not it was meeting the desired goals of the program. The study found the CMI gainsharing plan to be effective at fostering organizational profitability/budgetability, employee retention, quality of work life, morale, information sharing, and organizational reward sharing. Recommendations aimed at enhancing CMI's gainsharing system were also presented.

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Chapter 1 - Introduction

Gainsharing plans have been in existence since the late 1930s when the Scanlon Plan was implemented by Joseph Scanlon at the Empire Steel and Tin Plate Company of Cleveland. The site was a unionized steel mill on the verge of bankruptcy. The management was attempting to save the company, and the workers were attempting to save their jobs. Joseph Scanlon created a program where the workers would participate in enhancing the productivity of the firm and the management would share with the workers a portion of the gains in revenue due to increased productivity. It was a win-win solution.

Since that first implementation, gainsharing has spread to encompass 15% of American corporations with over 500 employees (N.Y.S.E., 1982 cited in Gowen, 1990). In a recent study, Markham, Scott, and Little (1992) found gainsharing plans in industries such as agriculture/mining, transportation/communications, retail/wholesale, financial, services, and professional/medical. The most noticeable observation of the study was the lack of gainsharing plans in the government sector even though 70% of the government respondents were aware of gainsharing and 16% of those aware of gainsharing had considered implementation. The observation that gainsharing was not detected in the government sector indicates a need to better understand how gainsharing operates in the public-sector.

1.1 Problem Statement

Changemasters, Inc. (CMI) is a small, public-sector, research and development organization. CMI has had a gainsharing system in place since 1987. Over the years CMI's gainsharing system has been altered and modified to address changes in CMI's internal and external environment (for a description of CMI's gainsharing plan including the mechanism by which they gainshare, see Chapter 2 section 2.5.3). Changes made to the gainsharing system, however, have not been formally documented or portrayed, and the system has never been formally evaluated to determine whether or not it is meeting its desired outcomes. This is the problem that this research study explores.

1.2 Justification for this Research

Although the literature contains many studies documenting gainsharing systems in large manufacturing organizations (e.g., Rossler & Koelling, 1993; Lawler, 1990; Musgrave, 1982; Markham, Scott, & Cox, 1992), there appear to be few, if any, studies documenting the application of gainsharing for small, research and development, public sector organizations. What would the design of the gainsharing system look like for a small, R&D, public sector organization? How would such an organization implement gainsharing? What results would they achieve? What lessons would be learned? These questions represent gaps in the gainsharing literature that need to be filled.

In considering the justification for this research, I approached the response from three different perspectives: industrial engineering, CMI academic and research plan (ARP), and personal developmental.

Industrial Engineering Perspective

Industrial engineering deals with "the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy" (Turner, Mize, Case, & Nazematz, 1993). Industrial engineers have traditionally been involved in incentive pay and gainsharing as a method for improving organizational system performance. Frederick W. Taylor, the founder of industrial engineering, strongly advocated the use of incentive pay. Mitchel Fein, an industrial engineer, was the developer of Improshare. Many, if not most, industrial engineering textbooks (e.g., Niebel, 1988) contain a section on incentive pay and gainsharing. This research study attempts to build upon the existing industrial engineering body of knowledge by exploring how a small, R&D, public sector organization implemented and administered their gainsharing system.

CMI Academic and Research Plan (ARP)

The CMI Academic and Research Plan is a management tool used to direct CMI research efforts in a strategic manner to ensure that research builds upon research. This research study supports CMI's ARP because it builds upon previous CMI gainsharing research. Paul Rossler's (1988) thesis document, Using a Productivity Measurement Model to Drive Gainsharing, describes the establishment of CMI's gainsharing system. This research study builds upon his study by reviewing and evaluating CMI's gainsharing system seven years after implementation.

Personal Developmental

The research study will enable me to develop my knowledge, skills, and abilities as both a manager and researcher. I will develop and add to my knowledge of motivation, compensation, and the research process. I will develop skills and abilities in applying the research process and in managing a major research project. Finally, I feel it is my

responsibility to contribute to the existing body of knowledge. This research study is meant to add one more piece to the puzzle of improving organizational performance.

1.3 Research Models

Frankfort-Nachmias & Nachmias (1992) define a model as a representation of reality which delineates certain aspects of the real world as being relevant to the problem under investigation. In the case of this research project, models are used to portray the phenomena under study from three perspectives: a global conceptual model portraying how motivation and gainsharing fit within the Grand Strategy System (the planning system of CMI); a conceptual model portraying the components of CMI's motivation front and how gainsharing is an important part of the motivation front; and an operational research model portraying the components and relationships of the components of CMI's gainsharing system (the specific phenomena under study). As my research is primarily descriptive, the models I employ are descriptive.

1.3.1 Global Conceptual Model

Within the context of continuous improvement and large-scale organizational change, motivation is only part of the whole that must be managed in order to create organizational performance improvement. The Grand Strategy System (Sink and Monetta, 1991) consists of four basic components: documentation of the past, documentation of the present; interventions aimed at fronts or sub-systems; and a strategic improvement plan for the future. Documentation of the past and present allows the organization to establish a performance baseline. Interventions managed by fronts (including the motivation front) create integrated and systematic change to targeted sub-systems. A strategic improvement

plan for the future provides constancy of method and continuity of effort. The Grand Strategy System (see figure 1.1) shows that motivation is but one of many fronts that must be managed to create improved organizational performance.

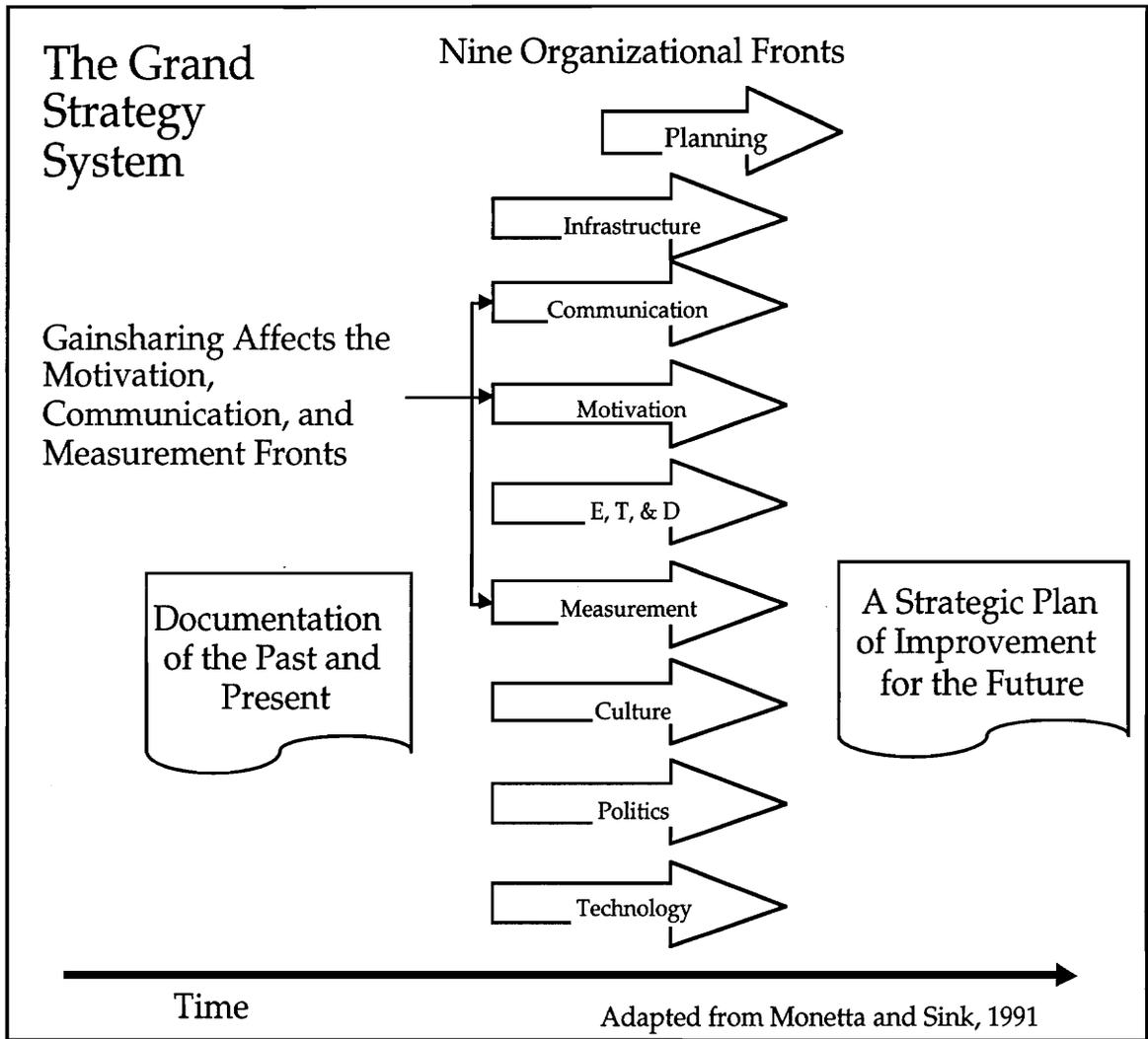


Figure 1.1: Grand Strategy Systems Model

1.3.2 Conceptual Model

CMI's gainsharing system is but one of many components of the motivational front.

Although many motivational models (e.g., Vroom's Expectancy Theory, Adam's Equity

Theory) apply to CMI's motivation front, I believe the model that best portrays how gainsharing fits within the motivation front is an enhancement of Hackman & Oldham's Job Characteristics Theory. The model I have applied to CMI's motivation system divides the components of the motivation front into intrinsic motivators and extrinsic motivators. Intrinsic motivators encourage motivated behavior through performance of the job. Performance of the job itself can be rewarding (e.g., satisfaction from a job well done). Extrinsic motivators consist of all rewards that are not derived from the job itself (e.g., a fair days pay for a fair days work). Figure 1.2 portrays the model of CMI's motivation front along with key components of CMI's motivation front. As indicated in the model, gainsharing is both an intrinsic and extrinsic motivator. It is an intrinsic motivator because it is a component of the job itself that provides individuals, teams, and organizations with feedback on performance as well as providing autonomy to individuals to earn as much income as they so desire. Gainsharing is also an extrinsic motivator because the monetary rewards associated with the gainsharing bonus are not derived from the job itself.

The CMI Motivation Front

Intrinsic Motivators

Skill Variety
 • No job description

Feedback from Job
 • All hands meetings
 • Planning sessions
 • VMS
 • **Gainsharing**

Autonomy
 • Self managing teams
 • Affinity groups
 • **Gainsharing**

Task Identity
 • Client engagement process

Task Significance
 • Individual Responsibility
 • Commitment to Vision

Extrinsic Motivators

Special Rewards
 • Books
 • Gift Certificates

Education, Training, and Development
 • Deming Seminars
 • Workshops
 • Other Seminars
 • University Classes

Compensation
 • University base pay
 • **Gainsharing**

Working Conditions
 • Office (RS/Whit)
 • Climate controlled
 • QWL events

Benefits
 • Full health coverage for full-time personnel

Figure 1.2: Motivation Front Model

1.3.3 Operational Model

The Grand Strategy System Model (figure 1.1) portrays how motivation is but one of the fronts that CMI manages to improve their organizational performance. The Motivational Front Model (figure 1.2) portrays the components of CMI's motivation front and how the gainsharing system is but one component of the motivation front. My Operational Research Model (figure 1.3) portrays how CMI's gainsharing system is expected to deliver

outcomes as moderated by the presence of critical enablers. In my research study, I have evaluated the gainsharing system to determine whether the system is perceived to be contributing to the gainsharing system outcomes and whether the critical enablers are perceived to be present.

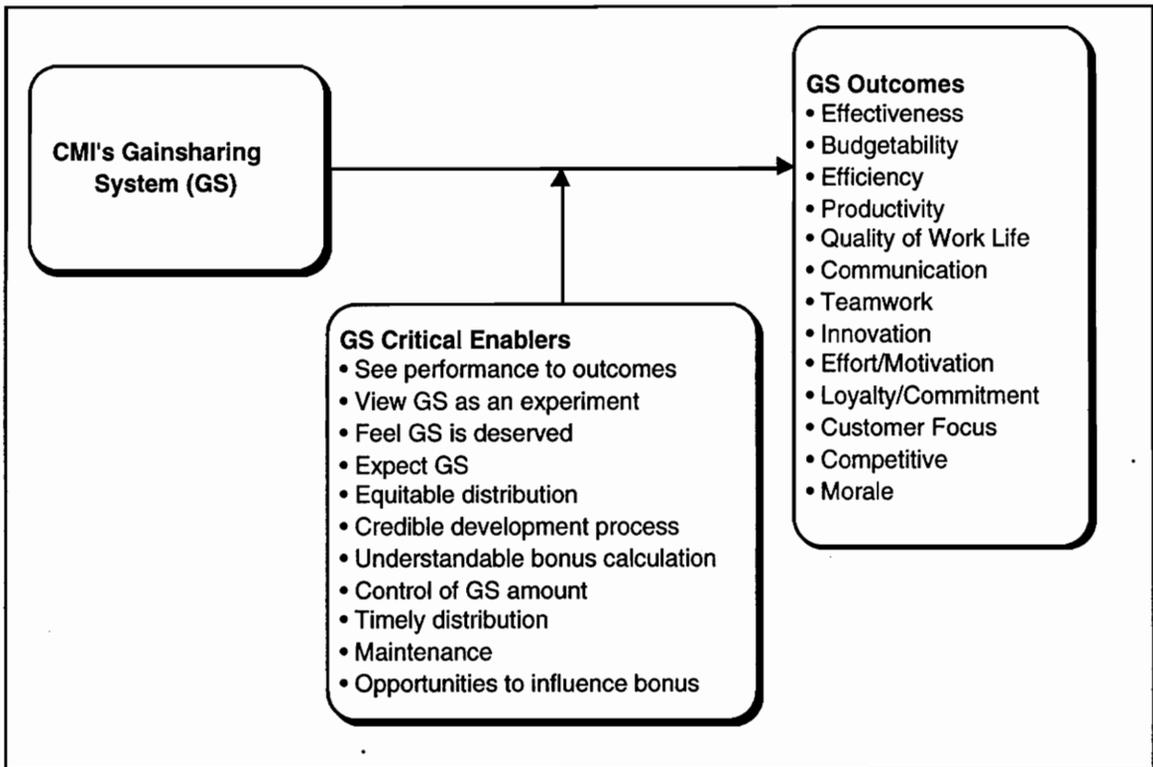


Figure 1.3: Operational Research Model

1.4 Research Questions

As previously mentioned, the problem this research study attempts to solve is to document the evolution of CMI's gainsharing system from its conception in 1987 to the present and evaluate it to determine whether it is meeting its desired outcomes. Therefore, this research study answered the following research questions:

- 1) How has CMI's gainsharing system design evolved from startup to present? What has worked and what has not?
- 2) After eight years of implementation, does it appear that the gainsharing system is effective?
- 3) What does the gainsharing system design for a small, R&D, public sector organization look like?
- 4) The gainsharing literature states that there exists several critical enablers that are necessary to ensure success of a gainsharing system. Is there a perception that the following critical enablers:
 - a credible gainsharing system design;
 - an understandable and influenceable bonus;
 - a timely bonus;
 - involvement opportunities; and
 - gainsharing system maintenanceare in place in CMI's gainsharing system?
- 5) The gainsharing literature states that performance improves as a result of gainsharing. The CMI leadership team expects the gainsharing system to result in improved performance in several dimensions. Is there a perception that CMI's gainsharing system results in improved performance in the following dimensions:
 - effectiveness;
 - profitability/budgetability;

- efficiency;
- productivity;
- quality of work life;
- communication;
- quality;
- teamwork;
- innovation?

- 6) Is there a perception that CMI's gainsharing system rewards personnel?
- 7) Is there a perception that CMI's gainsharing system fosters loyalty and commitment?
- 8) Is there a perception that CMI's gainsharing system sparks greater effort and motivation?
- 9) How might the CMI's gainsharing system be improved?

1.5 Research Objectives

To answer the previously stated research questions, the following objectives were met:

- 1) documentation of the evolution of CMI's gainsharing system from its conception in 1987 to the present;
- 2) evaluation of CMI's present gainsharing system to determine whether it is meeting its desired outcomes;
- 3) construction of a list of what has or has not worked based upon CMI's eight years of gainsharing experience; and
- 4) generation of recommendations on how the gainsharing system can be improved based on the body of knowledge and conclusions.

1.6 Measures of Success

I used the following criteria to measure my success in this research study:

- effectiveness (whether I met my research objectives; whether I did what I said I would do; whether my research study is useful to CMI);
- quality (whether my research study is accepted by my committee);
- quality of work life (whether I enjoyed myself as I worked through the research project and learned from the experience);
- impact (the extent to which I contributed to the body of knowledge);
- efficiency (whether I managed the use of my time, energy, and money in the completion of this endeavor; whether I executed my research study in the right way)

I believe I have been effective as I have met all of my research objectives and I believe my research and recommendations are useful to CMI. I believe I have been successful from a quality of work life perspective because I have enjoyed this experience and learned a significant amount of information. There were several rough spots but I believe I have succeeded overall. I could not have obtained this experience in any other way. I believe I have been efficient because I have finished my thesis on time using the appropriate amount of resources. In hindsight there are several things I would have done differently (see chapter 7, lessons learned), but overall I am satisfied on this dimension. The quality and impact dimensions will be evaluated in the near future.

Chapter 2 - Body of Knowledge

2.0 Body of Knowledge Overview

The purpose of the body of knowledge chapter is to provide a review of the literature related to the problem being studied. I will begin by listing my research questions and what the body of knowledge contributes to each of the questions. This is being done to focus my body of knowledge around the questions that I am seeking answers for. I will then provide an overview of the basics of gainsharing. Next, I will discuss some of the more prominent gainsharing research, the critical success factors associated with gainsharing, and positive outcomes that occur as a result of gainsharing. Finally, I will discuss and describe Change Masters, Inc., the field site and CMI's gainsharing plan. One should note that although the following literature review specifically relates to gainsharing and the field site, an understanding of compensation management, motivation, and the Grand Strategy System is also required to fully understand how gainsharing fits within the larger "picture" of organizational performance improvement. Appendix F contains literature on compensation management, motivation, and the Grand Strategy System if one desires a "refresher" on those three subjects.

2.1 Body of Knowledge Contribution to the Research Questions

In this section I will state each of the research questions and how my body of knowledge contributes to the answers that I am seeking.

Research Question #1: How has CMI's gainsharing system design evolved from startup to present? What has worked and has not worked?

Much has been written on the evolution of gainsharing systems (Hatcher and Ross, 1991; Masternak, 1992; Markham, Scott, and Cox, 1992). The common stages include an exploration stage to learn about gainsharing (often an external consultant provides education and training), a design stage to reduce the practice of gainsharing to the specific case site (often done through the use of a task force or committee) where the gainsharing formulas and employee involvement mechanisms are developed, an implementation stage to implement the plan, a trial stage to test the plan, and an on-going maintenance stage where the plan is modified to address changes in the business environment and the gainsharing system participants. The on-going maintenance stage continues until the plan is discontinued.

Gainsharing plans are very diverse in their manifestations. Markham, Scott, and Little (1992) in a survey of gainsharing plans across multiple industries found 44% of the gainsharing plans to be custom designed. Even Scanlon, Rucker, and Improshare plans are customized to a degree as they are tailored to meet the needs of the specific organization. The aspects of the different program designs that tended to work were employee votes prior to implementation to increase buy-in, formal suggestion programs, formal employee participation, bonus splitting between the company and the employees, supportive managerial attitudes, and productivity measures to drive the formulas (rather than profitability).

Research Question #2: After eight years of implementation, does it appear that the gainsharing system is effective?

Given that this research question is addressed specifically to CMI's gainsharing system, the body of knowledge does not directly contribute. However, Markham, Scott, and Little (1992) and White (1979) found that the number of years a company has a gainsharing plan correlates to the plan's success. Thus, given that CMI's plan has been in place for eight years, the literature suggests that the plan is successful and effective.

Research Question #3: What does the gainsharing system design for a small, R&D, public sector organizational look like?

Thomas and Olson (1988) state that eight components constitute the design of an effective gainsharing plan. They are: plan objectives, definition of performance measures, funding formula, distribution method, size of payment, payment form, frequency of payment, and support systems (e.g., teams, steering committees, suggestion systems). Miller and Schuster (1987) studied six types of gainsharing plans (Scanlon, Improshare, Rucker, Productivity/Waste Bonus, Group/Plant, and Darcom) and compared them based on their theory, goals, participation, suggestion system, role of supervisor/manager/union, bonus formula, payout frequency, and impact on management style. Neither study specifically addressed what the gainsharing system for a public-sector organization would look like. The common ground between the two studies suggests the following design. Plan goals of increasing productivity, worker attitude, communication, teamwork, and quality should be considered. Measurement should be based on productivity or profitability. Gains should be split between the company and employees (perhaps 50/50). Suggested distribution methods are to distribute as an equal percentage of pay or distribute using equal shares. Payout frequency should be weekly, monthly, or quarterly depending on the ability of the

accounting system to support gainsharing. Support systems included mechanisms to provide employees with the opportunity to improve organizational performance. Some of the ones suggested were teams, committees, formal suggestion systems, and supervisor/manager support of employee participation.

Research Question #4: Is there a perception that the following critical enablers (a credible gainsharing system design, an understandable bonus, an influenceable bonus, a timely bonus, involvement opportunities, and gainsharing system maintenance) from the literature are in place?

Lawler (1990) has stated that a set of general elements or critical enablers exist that need to be included in all gainsharing plans in order to ensure gainsharing system success. The elements are a trusted development process, an understandable/influenceable bonus, a timely bonus, comprehensive measures, involvement opportunities, and maintenance. A trusted development process is necessary to ensure employee buy-in. An understandable and influenceable bonus is needed to establish line of sight. A timely bonus is needed to foster the linkage between high performance behaviors and the bonus. Comprehensive measures are needed to ensure that gainsharing system payout is strongly linked to organizational performance. Involvement opportunities are needed to allow employees to improve organizational performance and increase gainsharing. Maintenance is needed to ensure continuous alignment of the gainsharing system to the other organizational systems and changes in the business environment. Lawler's statements were supported by a case meta-analysis by Bullock and Tubbs (1990).

Research Question #5: Is there a perception that CMI's gainsharing system results in improved performance on the dimensions of effectiveness, profitability/budgetability, efficiency, productivity, quality, quality of work life, communication, teamwork, and

innovation?

Research Question #6: Is there a perception that CMI's gainsharing system rewards personnel?

Research Question #7: Is there a perception that CMI's gainsharing system fosters loyalty and commitment?

Research Question #8: Is there a perception that CMI's gainsharing system sparks greater effort and motivation?

Research questions five through eight are similar in that they deal with the outcomes of successful gainsharing plans. A large portion of the empirical research on gainsharing systems have been geared toward determining the results of successful gainsharing plans. Hatcher and Ross (1991), in their review of an organization that moved from an incentive system to a gainsharing system, found gainsharing to result in a significant decrease in the number of grievances and a significant increase in product quality. Bullock and Lawler (1984), in their review of 33 case studies on gainsharing, found gainsharing to result in improve productivity, cost savings, individual attitudes, quality of work life, ideas, suggestions, labor-management cooperation, pay, and bonuses. Doherty, Nord, and McAdams (1989) found gainsharing to result in improved productivity, safety, attendance, profitability, and quality costs. The literature suggests that gainsharing plans result in improved organizational performance, the rewarding of personnel, the fostering of loyalty and commitment, and the sparking of greater effort and motivation.

Research Question #9: How might CMI's gainsharing system be improved?

Research question nine deals specifically with how CMI's gainsharing can be improved. At this point, the body of knowledge does not directly contribute to the answer to this question. The body of knowledge contribution to this question will be discussed in chapter six.

2.2 Gainsharing Overview

As organizations seek to become organizations of the future, the literature suggests variable incentive systems and organizational pay-for-performance (e.g., gainsharing, profit sharing, employee ownership) that will contribute significantly to organizational performance improvement by increasing motivation, fostering employee involvement, creating strong organizational cultures, and allowing for flexible labor costs (Sink & Rossler, 1988; Schuster & Zingheim, 1992; Lawler, 1990; Doyle & Doyle, 1992). Despite the large number of supporters for incentive systems and organizational pay-for-performance, this viewpoint is not uncontested. Kohn (1993) argues that the opposite is true. He states that incentive pay or pay-for-performance actually results in reduced performance as rewards demotivate, punish, rupture relationships, ignore problem-solving, discourage risk-taking, and undermine interests. Deming (1993) states that incentive pay and pay based on performance result in demoralization of all involved. The issue of whether the use of incentive systems and pay-for-performance results in improved organizational performance is clearly unresolved. Kohn's and Deming's assertions, however, can not be ignored. Their arguments will be responded to in the following discussion of gainsharing.

2.2.1 An Operational Definition of Gainsharing

Before a topic can be discussed and studied, it must first be operationally defined. Numerous definitions of gainsharing are found in the literature (e.g., Lawler, 1990, Henderson, 1994, and Milkovich and Newman, 1993). "In a typical gainsharing plan, financial gains in organizational performance are shared on a formula basis with all employees in a single plant or company location. A historical base period of performance

is established as a basis for determining whether gains have occurred. Typically, only controllable costs are measured in computing the gain" (Lawler, 1990). Doyle and Doyle (1992) define gainsharing as a combination of incentives and participation where employees share in the productivity gains brought about by their ideas, suggestions, and best efforts. "Gainsharing plans share improvements in productivity, cost savings, and quality with employees who are members of a group that is instrumental in accomplishing these improvements" (Schuster and Zingheim, 1992). From these three definitions of gainsharing, several themes emerge:

- 1) Gainsharing involves the sharing of financial gains due to improved performance.
- 2) Gainsharing involves participation (e.g., sharing of ideas, suggestions, group accomplishment).
- 3) Gainsharing involves measurement to determine whether performance has improved.
- 4) Gainsharing motivates participants to increase performance.

My operational definition of gainsharing is that it is *an organizational reward system that financially rewards individuals for gains in improved organizational performance due to their increased participation and motivation.*

2.2.2 Types of Gainsharing Plans

Three basic types of gainsharing plans exist: Scanlon (developed in the 1930s), Rucker (developed in the 1930s), and Improshare (developed in the 1970s). The Scanlon Plan consists of two components: reward sharing and employee participation. The reward sharing is determined by calculating the gains in productivity that result through employee participation and involvement. Those gains are then split between the employees and the

company using a variety of diverse formulas. The participation component consists of involving employees through education, training, information sharing, employee suggestion programs, and distributed leadership and ownership. The Scanlon Plan is not a specific program but the application of principles to a company's unique business-environment. The Rucker Plan is similar to the Scanlon Plan except that it emphasizes participation less and has a more comprehensive (and complicated) bonus calculation. The Rucker Plan calculates its ratio as labor costs over value-added where value-added equals sales value of production minus materials, supplies, and service costs. Improshare calculates its ratio as the actual labor (direct and indirect) hours of production over the standard hours of production. The standard is determined through engineered time standards. Improshare does not have a specific employee participation component. Table 2.1 summarizes the differences in the three basic gainsharing plans as well as three gainsharing plan variations. Keep in mind that specific plans vary and that the table is portraying generalizations of the six plans listed.

Table 2.1: Types of Gainsharing Plans

Program Dimension	Scanlon	Rucker	Improshare
Philosophy/ Theory	Org-single unit; share improvements; people capable/ willing to make suggestions, want to make ideas	Primarily economic incentive; some reliance on employee participation	Economic incentives increase performance -
Primary Goal	Productivity Improvement	Productivity Improvement	Productivity Improvement
Subsidiary Goal	Attitudes, Communication, Work Behaviors, Quality, Cost Reduction	Attitudes, Comm., Work Behaviors, Quality, Cost Reductions	Attitudes, Work Behaviors
Work Participation	Two Levels of Committees: - Screening (1) - Production (many)	Screening (1) Production (1) (Sometimes)	Bonus Committee
Suggestion Making	Formal System	Formal System	None
Role of Supervisor	Chair, Production Committee	None	None
Role of Managers	Direct Participation in Bonus Committee Assignments	Idea Coordinator, Evaluate Suggestions, Committee Assignments	None
Bonus Formula	(Sales) / (Payroll)	(Bargaining-unit Payroll) / (Production Value)	(Engineering Std. * Base Productivity Factor) / (Total Hours Worked)
Prequency of Payout	Monthly	Monthly	Weekly
Role of Union	Negotiated Provisions, Screening Committee Membership	Negotiated Provisions, Screening Committee Membership	Negotiated Provisions
Impact on Management Style	Substantial	Slight	None

(Taken from Miller & Schuster, 1987)

Table 2.1: Types of Gainsharing Plans (Continued)

Program Dimension	Productivity/Waste Bonus	Group/Plant	DARCOM
Philosophy/Theory	Economic incentives increase performance	Economic incentives increase performance	Economic incentives increase performance
Primary Goal	Productivity Improvement	Productivity Improvement	Productivity Improvement
Subsidiary Goal	Attitudes, Work Behaviors	Attitudes, Work Behaviors	Attitudes, Work Behaviors
Work Participation	Bonus Committee	Bonus Committee	Bonus Committee
Suggestion Making	None	None	None
Role of Supervisor	None	None	None
Role of Managers	None	None	None
Bonus Formula	(Output per Hour) +/- (Waste)	Output per Hour	(Earned Hours) / (Direct Labor Hours)
Frequency of Payout	Monthly/Weekly	Quarterly	Quarterly
Role of Union	Negotiated Provisions	Negotiated Provisions	Negotiated Provisions
Impact on Management Style	None	None	None

(Taken from Miller & Schuster, 1987)

2.2.3 Opposition to Gainsharing: Deming and Kohn's Views

About gainsharing (a form of pay for performance) Deming (1994) states, "Abolish incentive pay and pay for performance. Give everyone a chance to take pride in his work. Performance of the individual can not be measured, except possibly on a long-term basis." Deming (1994) also states, "Monetary reward to somebody, or a prize, for an act or achievement that he did for sheer pleasure and self-satisfaction may be viewed as

overjustification. The result of monetary reward under these circumstances is at best meaningless and a source of discouragement." On the surface, Deming's message seems clear. We should abolish pay for performance (including gainsharing systems) as it is a form of overjustification and will result in reduced performance. Yet a closer look at Deming's message possibly results in another interpretation.

Deming (1994) also states, "The most important act that a manager can take is to understand what it is that is important to an individual. All people are motivated to a different degree extrinsically and intrinsically. In this way, a manager can provide positive outcomes for his people, and may even move some people toward replacement of extrinsic motivation with intrinsic motivation." What Deming seems to be saying is the following:

- 1) provide your people with a reward that they value (which may or may not be monetary);
- 2) do not reward based on individual performance as individual performance can only be measured using a long-term perspective; and
- 3) do not provide undeserved rewards as that may result in overjustification.

With respect to gainsharing, Deming's points seem to apply in the following ways. As one of the reasons that people work in an organization is to earn a wage, the monetary payout that gainsharing systems provide is not unvalued. As gainsharing is an organizational reward system, the unit of analysis is the organization (not the individual), so individuals are not being individually appraised and rewarded accordingly. Finally, as gainsharing provides a mechanism to share in the success of the organization, the payout is not undeserved. People within the organization were the ones who worked to create the gains; the payout they receive is their due and well-deserved compensation. Gainsharing does not appear to conflict with Deming's principles.

Kohn (1993) takes an extremist point of view with respect to rewards in general [e.g., monetary (including gainsharing), recognition, and praise] as he believes that the use of extrinsic rewards results in reduced performance since rewards achieve only temporary compliance, punish, rupture relationships, ignore reasons, discourage risk-taking, and cut the interest rate. If Kohn were to repeat this present study he would hypothesize that CMI's gainsharing system would negatively affect performance across all dimensions (e.g., quality, efficiency, productivity, communication, teamwork, and commitment). To address Kohn's hypotheses on the effect of extrinsic rewards, I will discuss each of his arguments in turn.

Kohn's first argument is that rewards work only to secure temporary compliance rather than long lasting changes in attitudes or behavior. He further states that when the rewards run out the compliance ceases and behaviors revert back to their original state. Extrinsic rewards do not create a lasting commitment. Kohn is probably correct in his point, but is this really a bad thing? After all, how many of us would choose to come to work each day and do what we do if we did not receive the reward of our wages and salaries? Would we be committed to perform our jobs in the absence of the reward? When Kohn states that rewards secure temporary compliance he is correct, but to extrapolate to say that the removal of rewards would result in improved performance and high commitment is probably incorrect. It would probably be more valid to say that the removal of rewards (including gainsharing systems) would result in zero performance.

Kohn's second argument is that rewards punish. He argues that rewards punish for two reasons: 1) rewards are controlling as the rewarder is attempting to manipulate a behavior from the rewardee and 2) rewards that are not received when they are expected is the same as punishment. Kohn believes the solution is that rewards should not be made contingent

on behaviors. With respect to gainsharing systems, Kohn would state that the bonus should be simply distributed (not even a "thank you" or information sharing) so that employees could see no relationship between the bonus and anything else. What Kohn neglects to discuss is that every behavior or action or event has an associated consequence or reward. Reinforcement theory recognizes this universal truth when it states that behaviors are a function of associated consequences (e.g., we do what we do because we wish to obtain a consequence that we associate with what we do). Gainsharing systems are used to foster performance improvement by highlighting the relationship between the behavior of improving organizational performance and the consequence of receiving a bonus. Whether the bonus payout is perceived as manipulative and a punishment is based on the values and beliefs of individuals. However, by its very design, gainsharing systems reward only when organizational performance improves. Thus, expectations of a payout in the absence of improvement are not created.

Kohn's third argument against rewards is that they rupture relationships. He believes that the use of rewards fosters a competitive culture where all individuals strive for rewards at the expense of their team mates. Kohn appears to be criticizing the method of using rewards rather than the reward itself as he is criticizing the practice of rewarding competition among individuals. Gainsharing systems are based on organizational performance. Participants must work together to optimize performance. Individuals working at the expense of the system and their team mates would soon realize that their actions are harming the bonus pool. Gainsharing thus fosters and rewards teamwork.

Kohn's fourth argument is that rewards ignore reasons. He states that rewards are offered to fix the problem rather than the process or root cause. Again, Kohn seems to be criticizing the method rather than the reward itself as he is criticizing the practice of

rewarding symptom rather than root cause removal. Since gainsharing systems reward improved performance rather than fixed problems, Kohn's argument does seem to apply.

Kohn's fifth argument is that rewards discourage risk-taking as individuals will not engage in activities that will jeopardize the potential of achieving a reward. However, what if the rewards for taking risks and improving performance are much greater than the rewards of things staying the same? One would find individuals engaging in the risk-taking behaviors.

Kohn's sixth and final argument against the use of rewards is that the use of extrinsic rewards cut the interest rate by harming intrinsic motivation. This argument ties into Deming's discussion of overjustification. If we feel insulted or demeaned by a "reward" then it will negatively affect our performance. But then the "reward" is not a reward; it is a punishment. Whether something is a reward or not is determined by the receiver, not the giver. If I have just completed a research paper and my teacher gives me a quarter for my effort, I will feel pretty demotivated. I'll even feel insulted that the giver equated my work with a quarter. Despite the intentions of the giver, if I do not value or want the quarter, then it is not a reward. Whether extrinsic motivators undermine intrinsic motivation is more a function of how they are used rather than if they are used.

In summary, Kohn has made a case against the use of rewards. Kohn's argument, though, appears to be related more with how rewards are used rather than the reward itself. In that respect, a better argument has been made by Kerr (1975). Kerr stated that undesirable outcomes are more a result of rewarding the wrong behaviors rather than the act of rewarding itself as Kohn would have us believe. Kerr states that if we look at any behavior, it is possible to determine the consequences in place that motivate that behavior. If the behavior is undesirable, then we need to alter the consequences that support that

behavior. When Kohn states that rewards punish, rupture relationships, ignore reasons, discourage risk-taking, and cut interest, rather than throwing the good out with the bad, a more effective strategy may be to study and understand what consequences that are in place to encourage the dysfunctional behaviors that Kohn has cited. -

2.3 What the Research Says on Gainsharing

"Because methodologically adequate research on gainsharing is scant and not theory-driven, it is difficult to draw confident conclusions from the empirical literature" (Hammer, 1989). However, there are a few studies that shed some light on the subject. What follows is an overview of some of the more prominent studies on gainsharing.

2.3.1 The Scanlon Plan: Causes and Correlates of Success (White, 1979)

The White (1979) study is the classic study on gainsharing. The purpose of the study was to determine the causes and correlates to Scanlon Plan success. Based on a review of 40 studies on gainsharing, White hypothesized that gainsharing was positively related to employee participation in decision making, the number of years a company has had the gainsharing system, the attitude of management and the CEO toward participative management policies, expectations of success before the plan implementation, and that it was negatively related to company size. White looked at 23 companies that all, except for one, have used the Scanlon Plan. The companies were manufacturing oriented and located in the Midwest. The companies ranged in size from 23 to 3,000 employees with a median of 150. Based on his results, White determined the following:

- 1) employee participation as perceived by the employees is highly related to plan success;

- 2) company size was not a factor in determining plan success;
- 3) managerial attitudes toward the plan were related to plan success;
- 4) success of the plan was found to be related to the number of years that the company had had the plan;
- 5) favorable and realistic expectations of the plan prior to implementation correlated with plan success; and
- 6) level of technology did not seem to play a role in predicting plan success.

2.3.2 From Individual Incentives to an Organization-Wide Gainsharing Plan: Effects on Teamwork and Product Quality (Hatcher and Ross, 1991)

Hatcher and Ross (1991) assessed the changes within a company that moved from an individually oriented, piecework incentive system to a high-involvement gainsharing plan. Their intervention involved terminating the individual incentive system, paying plant-wide bonuses for performance improvement, and developing a highly structured employee suggestion system to allow employees to participate in work decisions. The site was an unionized American manufacturer of fabricated tubular exhaust components for the automotive equipment industry. The company was comprised of 405 hourly and 59 salaried employees. Hatcher and Ross utilized pre and post surveys to determine that perceptions of teamwork and concern for performance had improved. They utilized an interrupted time series analysis of four years of objective data to portray a significant decrease in the number of grievances and a significant increase in product quality (defects per 1000 decreased from 20.93 to 2.31).

2.3.3 Gainsharing and Organizational Development: A Productive Synergy (Doherty, Nord, and McAdams, 1989)

Doherty, Nord, and McAdams (1989) looked at two types of gainsharing programs: performance improvement programs and team suggestion programs. Performance improvement programs consisted of teams of individuals tasked with improving productivity, quality, costs, and attendance. They typically ran for 12-24 months. Team suggestion programs consisted of individuals tasked with generating ideas to increase revenues or reduce costs and typically ran for 10-16 weeks. Performance improvement programs and team suggestion programs differed from traditional gainsharing in that the unit of analysis was the team rather than the organization, award points rather than cash bonuses were used, rewards were linked directly to acceptance of suggestions, and the teams were designed to be temporary. The rewards that they received were "award points" that they could use to purchase merchandise (e.g., appliances, furniture). The award points were used to underscore the notion that the points were in addition to their compensation packages. The quantitative data indicated an improvement in productivity, quality, supply costs, safety, attendance, and the development of cost saving ideas. The qualitative data indicated an improvement in lateral and vertical communication, enhanced awareness of organizational goals, and personal growth and development.

2.3.4 Gainsharing: A Few Questions, and Fewer Answers (Bullock and Lawler, 1984)

Bullock and Lawler (1984) analyzed and described 33 case studies on gainsharing. All cases were done on a post hoc basis. Structurally, they found that most gainsharing plans had formal employee involvement structures and were based on labor productivity formulas, with a majority share of the gains distributed to employees on a monthly payout.

They found that most plans had been installed to improve labor-management relations, organizational effectiveness, and pay. Most plans had involved the use of an external consultant, employees had been involved in the design, and were favorable to the implementation. Situationally, the plans had been installed in both union and non-union organizations, small to large organizations, and organizations with differing management styles. Two-thirds of the plans reviewed were found to be successful and outcomes were improved productivity, cost savings, individual attitudes, quality of worklife, ideas, suggestions, labor-management cooperation, pay, and bonuses.

2.3.5 A Case Meta-Analysis of Gainsharing Plans as Organization

Development Interventions (Bullock and Tubbs, 1990)

Perhaps building on Bullock and Lawler (1984), Bullock and Tubbs (1990) reviewed 33 case studies on plans implemented over a 50 year time frame. Utilizing a case meta-analysis procedure, they tested whether gainsharing structural features (productivity measurements, including controllable costs in bonus formula, formal participation, payout percentage, and frequency of bonus), implementation factors (employee involvement in plan design, use of consultants, and employee favorability of gainsharing implementation), and situational conditions (size of organization, technology, union status, favorability of external environment, and management style) contributed to gainsharing system retention and impacted performance. Impact included productivity increases, declining costs, improved quality, greater employee job satisfaction, increased ideas and suggestions, improved labor-management relations, improved union-management relations, and whether bonuses were actually paid. Their sample consisted of 33 documented, independent cases on gainsharing (profit sharing, group incentive plans, employee involvement systems without bonuses, individual suggestion systems were excluded). Their study resulted in

the following:

- 1) organizations using formal employee involvement structures had higher overall intervention success and better results with innovation and labor-management cooperation;
- 2) use of productivity (rather than profitability) measures and the inclusion of controllable costs in the bonus formula were correlated with plan retention and impact;
- 3) programs with a monthly payout were found to be highly correlated with plan retention and impact;
- 4) employee involvement in the design was related to plan retention and impact as well as the use of external consultants and employee favorability of the plan;
- 5) no relationship was found linking situational factors (size, technology, union status, and favorability of external environment) to plan success;
- 6) the strongest predictor of plan retention and impact was found to be management style.

2.3.6 Overview of Gainsharing Research

Table 2.2 provides a brief review of the some of the literature that has been written on gainsharing.

Table 2.2: Overview of Gainsharing Research

Research Study	Purpose of Study	Research Findings
Archival Studies		
Collins, Hatcher, & Ross (1993)	To determine why organizations do or do not implement gainsharing.	The study looked at union status, mgt. expected outcomes, and work climate (level of participation, identity, participation, support for change, and consensus) and controlled for process, structure, change agent, size, industry, and financial bonus system. The study found that only "current level of cooperation" separated the two groups. Union status was found to be a moderator between level of participation and plan implementation and expected outcomes and plan implementation.
Doherty, Nord, & McAdams (1989)	To determine outcomes of gainsharing and factors influencing gainsharing.	Found gainsharing to result in: improved productivity, safety, attendance, profitability, and quality costs. Other results were: identification of potential leaders, improved communications, enhanced trust, increased employee knowledge of operations, increased worker awareness of worker performance, and development of a measurement system. Found gainsharing implementation to be positively affected by: employee participation, mgt. commitment, consultant follow-up. Found gainsharing implementation to be negatively affected by: competing priorities, participant distrust of program, objectives not perceived as performance based, complicated rules, uncoordinated motivation and training components, too long or demanding programs.
Case Studies		
Gowen & Jennings (1991)	To determine whether employee participation and group size affected gainsharing success.	They found that group size did not moderate the success of gainsharing programs. They also found participation to result in highly significant gainsharing system success.
Gross & Bacher (1993)	To determine enablers of gainsharing success across industries.	They found that mgt. support, employee acceptance, supportive culture, an effective design (participation, simple measurement, collaborative baselines, timing of payouts, low employee risk, and significant awards), timing of implementation, effective implementation, and plan evaluation were enablers.

Table 2.2: Overview of Gainsharing Research (Continued)

Hatcher & Ross (1985)	To document the use of gainsharing as an organization development tool and portray the plan results.	Plan results were: 49% reduction in scrap costs, 17.3% increase in direct labor efficiency, 14.5% reduction in warranty costs, 6.6% increase in indirect labor efficiency, 92% reduction in number of grievances, improved interdepartmental cooperation, communication, company satisfaction, trust, loyalty, and confidence in management.
Masternak (1992)	To determine why gainsharing does or does not work given similar organizations. Analysis of two gainsharing plans.	Employee expectations play a large role; employee expectations should be managed so that they are not unrealistic. Understanding and perceived fairness of the bonus calculation is very important. Someone should be responsible for coordinating activities. Employee attitudes play a large role. Training in the use of the system is very important.
Experiments		
Cooper, Dyck, & Frohlich (1992)	To investigate gainsharing plans and identify problems that may limit potential gains	The study found that fair distribution rules that are developed participatively can ameliorate the social dilemma inherent in gainsharing plans. Gainsharing plans must be fair in both the perception as well as the reality. The issues of procedural and distributive justice are crucial.
Hanlon, Meyer, & Taylor (1994)	To test the consequences of a gainsharing plan both during its operation and after the group bonus component was eliminated.	The study found that three months after the elimination of the group bonus, higher levels of moral commitment, prosocial behavior, and less intention to turnover were observed in the experimental group than the control group. In other words, many of the benefits of gainsharing that were created by the plan remained after the discontinuation of the group bonus portion.
Longitudinal Research		
Gowen & Jennings (1991)	To determine the effect of group size and participation on plan success in a unionized mfg. corporation.	Found that group size did not affect gainsharing. Found that level of participation affects gainsharing.
Schuster (1984)	To determine the effectiveness of a Scanlon Plan in a mfg. company.	Found the plan to result in increased productivity, stabilized turnover, reduced labor costs, increased market share, and improved job design (through suggestions).

Table 2.2: Overview of Gainsharing Research (Continued)

Meta-Studies		
Bullock & Lawler (1984)	<p>To answer common gainsharing questions.</p> <p>To state how plans differed in terms of structural factors, implementation factors, and situational factors.</p> <p>To determine the organizational impact of gainsharing.</p>	<p>They found that gainsharing positively affected: productivity, quality, cost reduction, customer service, individual attitudes, morale, quality of work life, idea/suggestion generation, innovation, labor-management relations, union relations, communication, supervisor-worker cooperation, and bonus/pay for employees.</p>
Bullock & Tubbs (1990)	<p>To describe research conducted to develop and test hypotheses about how gainsharing works.</p>	<p>They found that:</p> <p>there exists a relationship between a formal involvement structure and GS success;</p> <p>employee participation in the design was related to program retention and intervention impact;</p> <p>using outside practitioners enhanced program impact;</p> <p>a strong relationship existed between employee attitudes on gainsharing and gainsharing success;</p> <p>size, union status, and technology did not affect gainsharing success;</p> <p>the strongest predictor of gainsharing success was management style.</p>
Gowen (1991)	<p>To define gainsharing and its common forms</p> <p>To provide a historical overview of gainsharing applications</p> <p>To describe current status of gainsharing research and implementation</p>	<p>Found gainsharing to be on an increasing trend in the American private sector. Determined situations associated with successful gainsharing plans and identified outcomes that occur as a result of successful (and sometimes unsuccessful) gainsharing programs.</p>
Survey Research		
Hatcher & Ross (1991)	<p>To determine the effects on teamwork and product quality.</p>	<p>They found that the number of grievances declined and the mean scores of teamwork rose (suggesting improved employee relations, communication, coordination, and helpfulness).</p> <p>They also found that the number of defective parts per 1000 decreased substantially and the mean scores for concern-for-quality rose (suggesting greater employee concern for cutting costs and improving quality).</p>

Table 2.2: Overview of Gainsharing Research (Continued)

<p>Hatcher, Ross, & Collins (1989)</p>	<p>To determine the relationship of job complexity, assisting behavior, and suggestion contribution in gainsharing plans.</p>	<p>Found that job complexity moderated the relationship of suggestion contribution (one measure of gainsharing system success) and assisting behavior. Employees that are helpful are likely to contribute suggestions but-only if their jobs are complex.</p>
<p>White (1979)</p>	<p>To identify causes and correlates of Scanlon Plan success.</p>	<p>Found employee participation to be highly correlated with plan success. Found company size to not be a major factor. Found managerial attitudes to be highly correlated to plan success. Found duration of plan to correlate to success. Found employee expectations and the presence of a plan champion to correlate to success. Found that technology did not play a role in plan success.</p>

2.4 Critical Success Factors in a Gainsharing Design

Lawler (1990) has stated that a set of general elements exist that need to be included in all gainsharing plans in order for them to be successful. I call those elements critical success factors. These critical success factors are also supported in the research review in the previous section. Lawler (and others) state that the following are critical success factors:

- 1) A credible, trusted development process. The practices that are employed to implement a gainsharing plan must be viewed by the participants as credible. Practices could include allowing employee participation in the initial design and the use of an external consultant.
- 2) An understandable, influenceable bonus. For a gainsharing plan to be successful and motivate employees, line of sight must be established. Personnel must be able to understand the bonus calculation and the behaviors they can engage in to influence that bonus calculation.
- 3) A timely bonus. The bonus must be paid as close to the behavior as possible for

personnel to see the linkage between the bonus and their behaviors.

- 4) Comprehensive measures. The measurement system that is employed to drive the gainsharing system should adequately represent performance of the organization. Comprehensive measures ensure that the gainsharing system operates in alignment with organizational performance.
- 5) Involvement opportunities. Gainsharing systems are based on performance improvement. However, the personnel receiving the bonuses must have the opportunity to improve performance. If personnel do not have the opportunity to improve performance then the bonuses will not "motivate" them to improve performance.
- 6) Maintenance. Organizations are dynamic and systems change. The gainsharing system must then be changed to be aligned with the new system. The keys to successful maintenance are timeliness and credibility with employees. A change to the gainsharing system possesses a similar dynamic to the change involved in the initial implementation. Buy in is essential.

2.5 Outcomes of a Successful Gainsharing Plan

Successful gainsharing has been linked to a large number of positive outcomes. Based upon my review of the gainsharing research, the following are stated outcomes of gainsharing systems:

- enhanced teamwork and communication;
- increased participation;
- improved productivity, profitability, and quality;
- greater innovation through ideas and suggestions;
- improved employee attitudes and quality of work life;

- employees working smarter; and
- improved union-management relations.

2.6 The Field Site: Changemasters Inc.

To adequately describe the business environment in which Changemasters Inc. (CMI) operates, I have constructed a series of pseudonyms. The pseudonyms represent the larger systems that CMI is a part of. "*" indicates a pseudonym. Through the use of the pseudonyms, I have portrayed that CMI is but one piece of a much larger system. Thus the interventions CMI have made on their system have been influenced by their larger upline systems.

Changemasters, Inc.* (CMI*) is not an independent entity as they are part of a larger system. CMI* is a center within the Bucksburg Industrial and Systems Engineering Department* (BISE*). The BISE* department is part of the College of Engineering. The College of Engineering is part of Bucksburg Tech*. Bucksburg Tech* is the state land grant university. CMI* is the only unit of the larger system that is involved in the gainsharing experiment. The leadership team of CMI* are part of a private professional practice called GSS* that exists outside of the organizational boundaries of the Bucksburg Tech* system. Together, GSS* and CMI* form a virtual organization called a "teaching hospital." It is the relationship between CMI* and GSS*, the professional practice, that allows CMI* to gainshare. The relationship will be explained in greater detail in section 2.5.3. The organizational system of CMI is portrayed in figure 2.1.

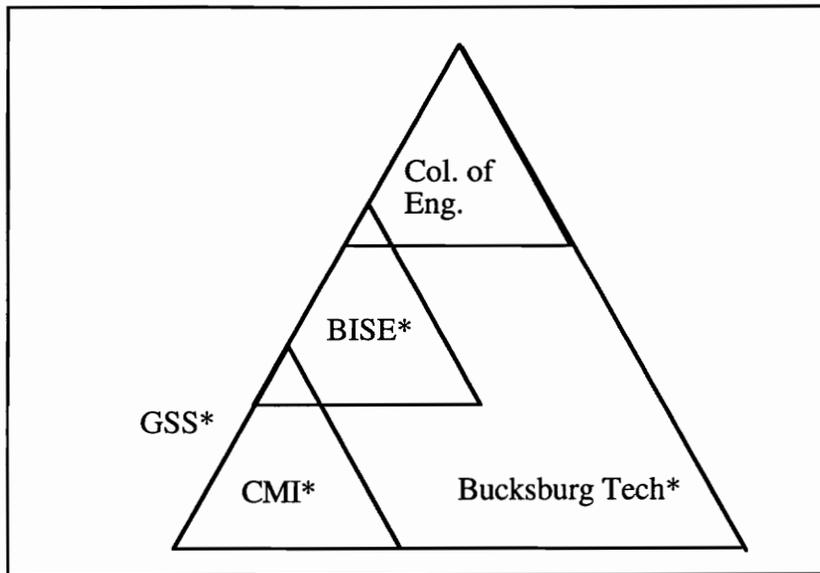


Figure 2.1: CMI Organizational System

2.6.1 Background of CMI

Established in 1980 by the State Council for Higher Education, CMI's mission is to perform research related to quality and productivity improvement, reduce that research to practice through their work with public and private sector organizations, and disseminate their lessons learned by teaching students. They are a self-funded, non-profit organization. Their industry may best be described as public-sector, research and development. They are a small organization (15-25 employees) with an annual budget of roughly 1.5 million. Their employees are divided into four teams that are not mutually exclusive. The four teams are the partners (the top management team), the business development team (BDT), the research and development team (RDT), and the support services team (SST). The partners are responsible for leading and managing CMI. The BDT's purpose is to build and develop the business and "reduction to practice" of CMI. The RDT's purpose is to support the research and development component of CMI. The SST's purpose is to

provide administrative support services to the entire center. CMI's mission is summarized in their mission statement (table 2.3).

Table 2.3: CMI Mission

<p>To generate and effectively share knowledge about quality and productivity management which organizations can use to improve their performance.</p>
--

CMI, similar to most organizations in the nineties, must continually increase their performance while reducing costs. Continuous improvement is particularly challenging for them due to their three-fold mission: teaching, research, and reduction to practice. They have a vision (table 2.4) of where they want to be in 10-15 years and a set of guiding principles (table 2.5) articulating their values as they strive for their vision.

Table 2.4: CMI Vision of the Future

Our organization(s) will, on or before the year 2000, be at the forefront of major efforts to solve critical societal, national and international problems. We will utilize our profound knowledge about quality and productivity management to accomplish this visibility, recognition and impact.

We will be an exemplary organization that people want to work for and with and that people come to observe. We will be known as an organization that truly is "an organization of the future." We will epitomize "future perfect".

We will be highly successful, in many respects. Our success will breed further success and we will be looked upon in our State and University as a true exemplar of an applied R&D center.

Our journal will be widely read and will be respected as are the Harvard Business Review and other similar journals.

Our Education and Development programs will be looked upon as being innovative and highly effective. We are viewed as the major source of "masters" and professional development for profound knowledge. Management Systems Engineering will be a premier and highly selective graduate program that integrates with R&D and business efforts and activities. Our Continuing Personal and Professional Development programs are synergistically interwoven with our full-time Mgmt. Sys. Eng. program.

Our reputation will be global. We are a major player in global developments in the area of productivity and quality management.

We will have high quality, partner/collaborative relationships with a critical mass of excellent organizations. We are highly selective of who we collaborate with, but not in an arrogant fashion.

We will be leaders in higher education, particularly engineering education, leadership and management reform.

The Institute of Industrial Engineers, the American Society of Quality Control, the American Society for Engineering Education, the National Society for Professional Engineers, the World Academy and Confederation of Productivity Sciences and others look to us as vital partners in their efforts to advance the field.

We will be viewed as a professional educational organization. We are viewed as the "Mayo Clinic" of Performance Management--we exemplify the best practices of a teaching hospital.

Our R&D work is completely endowed.

Other nations look to us to help them establish quality and productivity centers and network infrastructures. We are also looked to as designers and developers of reward and recognition systems for states and nations.

We will begin to have a major impact on the rate of growth of the State's output of products and services. We are doing this in a holistic fashion such that there is a balance between growth and quality of life.

We will be respected for our eclectic approach to quality and productivity, our values for balancing quality of life, quality of work life, productivity, quality, innovation, and profitability.

The various organizations comprising "CMI" will become known worldwide by that acronym as the best of the best in reducing organizational performance improvement theory to practice.

Table 2.5: CMI Guiding Principles

WE BELIEVE:

- People should be treated with dignity and respect.
- CMI should be a challenging, enjoyable place to work where creativity, openness, cooperation, responsiveness, and risk-taking are encouraged and rewarded.
- Professional and personal development are critical to the continued growth and success of CMI. We strive to facilitate professional and personal development by providing a wide variety of opportunities.
- Every CMI associate has a stake in the success of the organization.
- The needs of the individual must be balanced with the needs of the organization.
- Working both hard and smart is important.
- We strive to provide associates with the information, knowledge, power, and technology necessary to accomplish their objectives and make CMI succeed.
- A team-based environment is the key to our success.
- Everything that goes out the door should be “world class” quality, no matter how small or trivial, recognizing that “world-class” is defined situationally.
- Delighting our customers and satisfying their needs and expectations are critical to our success. We strive continually to exceed each individual customer’s expectations.
- Our commitment to excellence is a competitive advantage. We strive to make continuous improvement a reality by making CMI a prototype for the Organization of the Future where everyone is responsible and accountable for continuous improvement.
- We strive to be flexible and open-minded with each other and with our stakeholders.
- Constantly viewing the horizon for new opportunities is important to our success.

2.6.2 CMI's Compensation System

As previously discussed, CMI is not an independent organization. They are part of a larger system that has its own pay structure. Other than their gainsharing system (pay for work and performance); recognition/small reward (e.g., gift certificates, dinners) system (income

equivalent payments); education, training, and development system (income equivalent payments); CMI's compensation system is controlled by the larger system. The following is a brief overview of the larger system's compensation system.

CMI has six "classes" of employees: academic faculty, special faculty, external associates, classified staff, graduate students, and wage employees. Faculty (both academic & special) and classified staff receive the benefits of the larger system's compensation system.

External associates are those individuals that are associated with the center but who work on a contract basis and receive no benefits from the larger organization. Graduate students and wage employees do not receive any of the larger system's benefits except for direct financial compensation. The larger system provides the following compensation system benefits: direct financial compensation, paid leave (sick, annual, compensatory, overtime, administrative, military), unpaid leave (educational, parental), holiday leave, group life insurance, health insurance, retirement system, and deferred compensation plan. Faculty (academic and special) and classified staff receive all the benefits mentioned above.

Academic faculty also receive the benefit of professional activity time. CMI has no control over the benefits that are provided by the larger system.

For CMIers, change is a way of life. CMI is currently in the process of restructuring. They are being combined with a similar organization (which does not do gainsharing) in the same department. They have recently gone from a large budgetary shortfall to a huge budgetary surplus. Managing through large variations in business has been an ongoing challenge. In fact, the gainsharing system was first initiated as a mechanism to help CMI top management cope with the fluctuations in business. As CMI moves into the 21st century, the only certainty is that their organization of tomorrow will not look like their organization of today.

2.6.3 CMI's Gainsharing Plan

Since June 15, 1987, CMI employees have had a gainsharing system. They implemented a gainsharing system on themselves as part of an effort to improve their performance as well as to determine whether such a system would work in a knowledge worker (a worker whose primary output is intangible such as information, knowledge, and research) environment. Lawler (1990) has theorized that for pay to become a motivator, 5% of cash compensation should be at risk. For pay to become a significant motivator, 10%-20% of the employee's cash compensation should be at risk. The CMI top management team have attempted to reduce that theory to practice through gainsharing. They have attempted to pay their employees 15% less in fixed wages than their market value while paying their employees 15% more in overall wages (fixed plus variable) over their market value. Thus they have attempted to pay 35.3% ($1.15/.85$) of their employee's wages using gainsharing. The complete list of desired outcomes of the gainsharing system are portrayed in Appendix A.

CMI is able to gainshare because of the existence of Grand Strategy Systems* (GSS*), the professional practice of the CMI partners. The partners are those individuals working within CMI that collectively own GSS*. GSS* is not part of the larger organization that CMI is part of and thus not restricted by that larger organization's policies and guidelines. Technically, CMI does not have a gainsharing system. The gainsharing payout checks that CMIers receive originate from GSS* accounts. CMIers individually pay their taxes on those payouts. Officially, the payout checks are for services provided to the professional practice (rather than CMI). It is the use of the professional practice that enables CMI to practice in the gainsharing system experiment.

The original plan that was established in 1987 was not significantly different from the plan that exists today. The key characteristics were: membership, measurement system, bonus calculation, bonus division, and information sharing. Initially, all members of the organization except for the director were included in the gainsharing system. Their measurement system tracked profitability. The bonus calculation was determined by taking the change in cash accounts, subtracting out the profit goal for the quarter, and sharing the remainder with the employees. The bonus was distributed equitably as a percentage of base pay. A gainsharing memo was included with the bonus. The process that CMI is currently utilizing to gainshare is portrayed in figure 2.1.

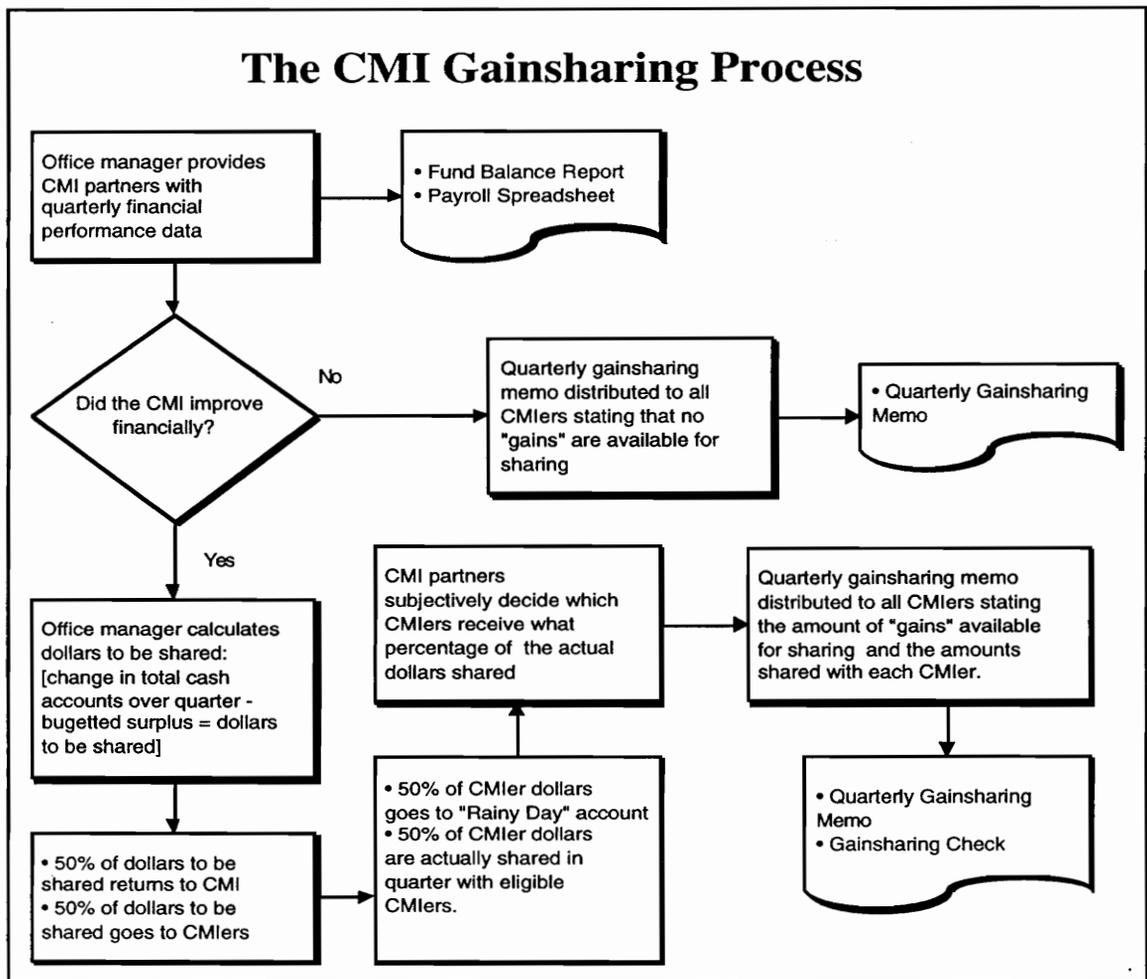


Figure 2.2: CMI Gainsharing Process

The key characteristics are membership, measurement system, bonus calculation, bonus division, and information sharing. Membership in the gainsharing plan includes all CMIers, with the exception of the CMI director and graduate students, who have been employed in excess of three months. The measurement system employed tracks and monitors financial performance. The quarterly change in cash accounts (minus the budgeted surplus) equals the gainsharing payout (the bonus calculation). The bonus payout is divided where 50% goes back to the organization, 25% is immediately shared, and 25% is put in the "rainy day" account to allow gainsharing during "dry" spells. Information on the gainsharing system is shared using the quarterly gainsharing memo. The memo describes CMI's quarterly financial performance for the quarter.

Chapter 3 - Research Methodology

3.0 Methodology Overview

The purpose of the research methodology chapter is to explain *how* I will execute my research project. Leedy (1989) states that there are four questions that must be answered in the research design [methodology]. They are:

- What data is needed?
- Where is the data located?
- How will the data be obtained?
- How will the data be interpreted?

The following sections answer Leedy's four questions and describe the steps I will execute to complete my research.

The type of research I will employ is formative evaluation (see Appendix E for a description of formative evaluation research and research in general) as I am working to improve CMI's gainsharing system. The desired result of formative evaluation research consists of recommendations for improving the system being studied. To develop recommendations, I will first have to study the gainsharing system then evaluate it. The balance of this chapter will describe how I will study, evaluate, and develop recommendations for CMI's gainsharing system. Figure 3.1 portrays the connections between the components of the this chapter.

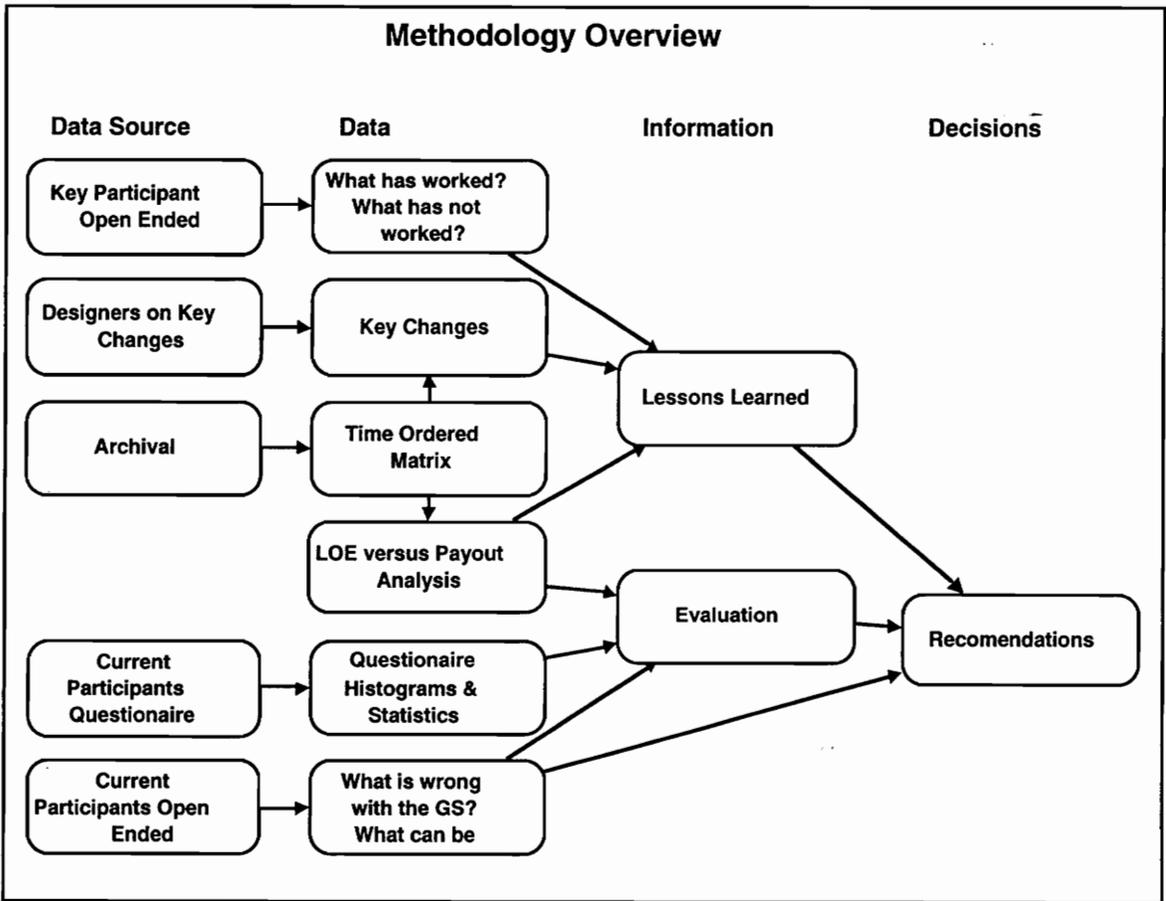


Figure 3.1: Methodology Overview

3.1 Data Sources

The data I will need for my research consists of archival data on the gainsharing system, additional qualitative information on each of the key changes from gainsharing system designers, responses to a structured interview that will be administered to key gainsharing participants, and responses to a structured interview that will be administered to current CMIers who have received gainsharing. The archival data will consist of documents (e.g., memos, quarterly reports, level of effort reports) that pertain to the gainsharing system and will be used to portray the critical incidents of the gainsharing system's past (key changes). The interviews with gainsharing system designers will be used to “flesh out” the key changes. The responses from key gainsharing system participants will be used to collect their perceptions of what had or had not worked with respect to the gainsharing system. The structured interview will be used to assess whether the gainsharing system is currently doing what it should be doing. The archival documentation, interviews with gainsharing system designers, and interviews with key gainsharing stakeholders will allow me to study CMI's gainsharing system and answer research question #1 (see section 1.4). Interviews with current gainsharing recipients and archival data on level of effort will allow me to evaluate CMI's gainsharing system and answer research questions #2, #4, #5, #6, #7, and #8 (see section 1.4). Combined, the study and evaluation of the gainsharing system will allow me to formulate recommendations and answer research questions #3 and #9 (see section 1.4).

Archival Data

The archival data will be collected to determine what interventions have been made on CMI's gainsharing system since its establishment, how the gainsharing system has evolved along a series of criteria (see section 3.2), and what inputs (dollars available for sharing) and outputs (dollars shared) have occurred. The archival data will consist of the quarterly

gainsharing distribution reports from startup to present, the education and training packet (called the gainsharing primer) used to initially train CMIers in gainsharing, memos describing the changes to and problems with the gainsharing system, past and present fund balance information, and level of effort (LOE) reports. LOE is a management tool used to monitor the number of employee hours spent on CMI related activities. The archival data will provide me with a list of changes that were made to the gainsharing system from startup to present as well as data on CMI's financial performance, gainsharing system payout, and level of effort. The following are repositories of archival data:

- CMI Electronic Files
- CMI Hard Copy Files
- Personal files of the CMI Director
- Personal files of the CMI Office Manager
- Personal files of a former CMI Senior Research Associate

Interviews with Gainsharing System Designers

The interviews with key gainsharing stakeholders will be used to collect additional data on the key changes that were made to the gainsharing system from startup to present. This data will be used to determine the circumstances behind each of the key changes and what the perceived impact of the key changes were on the gainsharing system. The key gainsharing stakeholders are those individuals who were involved in making decisions on the gainsharing system's design. This data is necessary to determine which of the specific key changes have or have not worked on the gainsharing system.

Interviews with Gainsharing System Key Participants

The interviews with key gainsharing system participants will be used to collect data on what aspects of the gainsharing system they perceive as having worked or not worked from

startup to present. The key gainsharing system participants are those individuals identified by myself and the CMI director as in possession of the needed information.

Structured Interviews with Current CMIs

The structured interview will be administered to all current CMIs who have received a payout from gainsharing. The structured interview will be used to determine current gainsharing participant perceptions on gainsharing system performance, evaluate the gainsharing system, and to solicit suggestions for improving the system.

3.2 Data Collection

The archival data will be collected from the repositories of data identified in section 3.1. The key changes will be extracted from the data and portrayed quarterly on a time ordered matrix. I define a key change as a change that adds or removes a component of the gainsharing system design. The time ordered matrix will have the following criteria: gainsharing quarter, unit of analysis (individual, group, or organization), dollar surplus, size of employee share, sharing ratio, change in fund balance, percentage of payroll, membership, number of participants, average payout, level of effort (LOE), gainsharing formula, distribution formula, significant business activities, changes in design since last quarter, and environmental influences. The criteria are defined in section 4.1.1. The start date will be June 15, 1987 and the ending date will be September 31, 1994. Each quarter on the time ordered matrix will portray what the gainsharing system looks like and produces based on the criteria. The time-ordered matrix will be used to describe the evolution of CMI's gainsharing system (research question #1). The LOE and gainsharing system payout data will be used to determine if gainsharing sparks greater effort and motivation (research question #8 and part of research question #2; see section 1.4).

The purpose of interviewing the gainsharing system designers is to provide additional data on each of the gainsharing key changes. To collect the necessary data, I will use structured interviews. In the interviews I will ask two questions: 1) What were the circumstances behind this key change; and 2) In hindsight, how did you believe this key change impacted the gainsharing system. The responses will tell me the circumstances behind each of the key changes and the perceived impact of the key changes. That will help me determine what aspects of CMI's gainsharing system have or have not worked (research question #1; see section 1.4).

The purpose of interviewing the key gainsharing system participants is to determine their perceptions of what has or has not worked in CMI's gainsharing system. In the interviews I will ask two open-ended questions: 1) As you envision CMI's gainsharing system, what aspects of that system worked and why?; and 2) As you envision CMI's gainsharing system, what aspects of that system did not work and why? Their responses will enable me to determine what aspects of the gainsharing system have or have not worked (research question #1; see section 1.4).

The purpose of interviewing the current participants of CMI's gainsharing system is to evaluate whether the gainsharing system is meeting its desired outcomes after eight years of experimentation and operation. The structured interview will be developed as follows:

- 1) I will question (via electronic mail) the CMI partners (who are the gainsharing system decision-makers) individually and determine their individual desired outcomes of the gainsharing system. The questions will be: What do you expect to happen as a result of gainsharing? Why do you feel the CMI should gainshare?
- 2) I will then share the results of the first round of interviews with the CMI partners

and question them individually again. The second question will be: Given the collective responses from you and your peers in the first round, would you like to add to your initial response?

- 3) Finally, I will develop the structured interview that will be used to determine whether the articulated desired outcomes of the partners are being met (based on the perceptions of the current gainsharing system participants). The structured interview form will be developed by taking each articulated desired outcome and forming it into a statement (e.g., if the outcome is an increase in productivity then the statement would be: Productivity is increased as a result of the gainsharing system). The interview will also allow me to capture the current gainsharing participant's perceptions on how the system can be improved.

The responses to the structured interview will allow me to evaluate CMI's gainsharing system and answer research questions #2, #4, #5, #6, #7, and #8 (see section 1.4).

3.3 Data and Analysis

The purpose of data analysis is to convert the raw data into refined data through data portrayal and summarization. This research study will consist of several groups of data:

- archival,
- perceptions on key changes from gainsharing system designers,
- perceptions on what has or has not worked on the gainsharing system from gainsharing system key participants,
- perceptions on gainsharing system outcomes and critical enablers from gainsharing system current participants, and
- perceptions on what aspects of the gainsharing system can be improved from gainsharing system current participants.

The archival data, perceptions from gainsharing system designer data, and perceptions from gainsharing system key participant data will be summarized and portrayed to form the study portion of my research and answer research question #1 (see section 1.4). -

The archival data will be refined by:

- 1) portraying the history of the gainsharing system from startup to present on a time ordered matrix,
- 2) extracting the key changes from the time ordered matrix based on my intuition as a researcher, and
- 3) charting the relationship between average level of effort (LOE) and average gainsharing system payout using line graphs and scatter plots.

The perceptions on key changes from gainsharing system designers will consist of perceptions on the circumstances behind the key change and the perceived impact of the key change. The perceptions on key changes will be refined by:

- developing "natural categories" or affinity groups for the key change circumstances using an affinity diagram,
- developing codes for each of the natural categories and coding each of the key changes based on the circumstance code and perceived impact on the gainsharing system (positive, negative, or no impact), and
- comparing code versus perceived impact to determine any relationship between the circumstance and the perceived impact.

The perceptions on what has or has not worked on the gainsharing system from gainsharing system key participants will be refined by:

- developing "natural categories" or affinity groups for aspects that were perceived as working or not working using an affinity diagram,
- grouping each aspect into the natural categories,

- comparing the number of aspects that worked with the number of aspects that did not work for each of the natural categories to determine if different categories tended to fall in the "worked" or "not worked" groups, and
- comparing differences in responses based on team membership (P/BDT or SST/RDT) to determine if team membership plays a role in perceptions.

The data on perceptions from current gainsharing system participants will be used to form the evaluation component of this research study and answer research questions #2, #4, #5, #6, #7, and #8 (see section 1.4). The perceptions from current gainsharing participants on gainsharing system outcomes and critical enablers (to be collected using a questionnaire) will be refined by:

- computing the means, medians, modes, standard deviations, and ranges for each of the quantitative responses to the questions on the questionnaire,
- charting each of the responses to the questionnaires on histograms based on overall, team (P/BDT, SST, RDT), and seniority (a participant in the system greater than or less than 3 years), and
- determining which of the statements from the questionnaire are significant based on a median greater than or equal to 3.5 or less than or equal to 2.5 and/or a mode greater than or less than 3.

The purpose of using descriptive statistics was to determine if the central tendency of the responses were greater than or less than three (neutral or no effect). The above decision rules were used to determine if the majority of the responses differed from neutral. Plus or minus .5 for the median and plus or minus one for the mode were chosen because they represented one unit of deviation in either direction from the neutral response. I used one unit of deviation in either direction because I believed any score not equal to three (neutral/no effect) to be significant. The mode was chosen because it is a common measure

of opinion (Ott, 1993). The median was chosen because it represents the center of a distribution without being subject to extreme scores. The mean was not used as a criteria because it was too sensitive and subject to distortion due to the presence of an extreme value. I did not use the standard deviation or the range because I was interested in the central tendency, not the degree of variation. T-tests were not used due to the small population size (N=10).

The perceptions from current gainsharing participants on how the gainsharing system can be improved will be used to formulate recommendations aimed at improving the system and answer research questions #3 and #9 (see section 1.4). Their perceptions will be refined by:

- developing "natural categories" or affinity groups for improvement ideas using an affinity diagram,
- grouping each improvement idea into the natural categories,
- comparing the number of ideas in the natural categories to determine if different categories tended to have greater numbers of ideas, and
- comparing differences in categories based on team membership (P/BDT or SST/RDT) to determine if team membership plays a role in perceptions.

3.4 Conclusions

The purpose of the conclusions chapter is to extract information from data. I will develop conclusions by reviewing my data and analysis chapter and answering my research questions. My intent in collecting the data and analyzing it the way I did was to answer my research questions. The following were my research questions and how I plan to answer them:

- 1) How has CMI's gainsharing system design evolved from startup to present? What has worked and what has not? I will answer this question by studying my time-ordered matrix. I will state the base design that was used in 1987 and describe the additions to that base as the years progressed. -
- 2) After eight years of implementation, does it appear that the gainsharing system is effective? This question will be based on the responses from current gainsharing participants. Based on the number of responses that are positively significant, I will state whether I believe the current gainsharing system design is effective.
- 3) What does the gainsharing system design for a small, R&D, public sector organization look like? Based on my body of knowledge and my study of CMI's gainsharing system, I will state what I believe the ideal gainsharing system should look like. This ideal design will be presented to the CMI leadership team in the form of a recommendation.
- 4) The gainsharing literature states that there exists several critical enablers that are necessary to ensure success of a gainsharing system. Is there a perception that the following critical enablers:
 - a credible gainsharing system design;
 - an understandable and influenceable bonus;
 - a timely bonus;
 - involvement opportunities; and
 - gainsharing system maintenanceare in place in CMI's gainsharing system?

This question will be based on the responses from current gainsharing participants. Based on the number of responses that are positively significant, I will state whether I believe the above critical enablers are in place.
- 5) The gainsharing literature states that performance improves as a result of

gainsharing. The CMI leadership team expect the gainsharing system to result in improved performance in several dimensions. Is there a perception that CMI's gainsharing system results in improved performance in the following dimensions:

- effectiveness;
- profitability/budgetability;
- efficiency;
- productivity;
- quality;
- quality of work life;
- communication;
- teamwork;
- innovation?

This question will be based on the responses from current gainsharing participants. Based on the number of responses that are positively significant, I will state whether I believe the gainsharing system is perceived to support the above listed performance dimensions.

- 6) Is there a perception that CMI's gainsharing system rewards personnel?

This question will be based on the responses from current gainsharing participants. Based on the number of responses that are positively significant, I will state whether I believe the gainsharing system rewards personnel.

- 7) Is there a perception that CMI's gainsharing system fosters loyalty and commitment?

This question will be based on the responses from current gainsharing participants. Based on the number of responses that are positively significant, I will state whether I believe the gainsharing system fosters loyalty and commitment.

- 8) Is there a perception that CMI's gainsharing system sparks greater effort and

motivation?

This question will be based on the responses from current gainsharing participants.

Based on the number of responses that are positively significant, I will state whether I believe the gainsharing system sparks greater effort and motivation.

9) How might the CMI's gainsharing system be improved?

This question will be based on current participant suggestions for improvement and my body of knowledge. Based on those two sources of information, I will make recommendations aimed at improving the performance of CMI's gainsharing system.

3.5 Recommendations

In a sense, the recommendations I will generate by this research study are the most important component of the study. This research study is a formative evaluation. The purpose of a formative evaluation is to improve an intervention. The recommendations I will generate, assuming that they are considered and implemented, directly impact CMI's gainsharing system.

The purpose of my recommendations chapter is to convert the information I've gained from my research into decisions aimed at improving the performance of CMI's gainsharing system. I will accomplish this through the study of my conclusions and body of knowledge. The technique I will employ to develop recommendations will be the gap analysis. My conclusions chapter will provide me with "where the gainsharing system is now." My body of knowledge and literature review will enable me to determine "where the gainsharing system should be." Once I understand the gap, I will brainstorm ideas to improve the system. I will select the best ideas for presentation in my recommendations

chapter.

I will also develop recommendations for future CMI-type organizations that are considering gainsharing. Those recommendations will portray my perceptions of the key learnings from CMI's experience. They will be based on my conclusions and my body of knowledge. I will generate ideas using brainstorming, select the ideas that have a large degree of support based on CMI's experience, and list them in bulletized fashion in my recommendations chapter.

Chapter 4 - Data and Analysis

The purpose of this chapter is to portray my data and the analysis of that data. In a sense, I am summarizing and analyzing the data to create a higher order of data. The outcome of this chapter is not "real" information as the data will not be analyzed such that it can be used for decision making. The complete conversion of data to information will take place in Chapter 5, the following chapter. However, this step is necessary to:

- 1) clearly portray the decision processes that I am employing to create information such that if this study were repeated the results would be similar,
- 2) summarize and analyze the data I have collected,
- 3) establish the foundation from which my conclusions will be drawn, and
- 4) portray my exploration of the data I have collected.

4.1 The History of the Gainsharing System

The results in this section portray longitudinal data about the gainsharing system. It is organized into three sections: gainsharing system time ordered matrix, analysis of key changes, and analysis of level of effort versus gainsharing system payout. The gainsharing system time ordered matrix portrays the evolution of CMI's gainsharing system as indicated on gainsharing system criteria. The analysis of key changes portrays the perceived impact and circumstances of the key changes identified from the time ordered matrix. The analysis of level of effort versus gainsharing system payout portrays the relationship between hours worked in CMI and the gainsharing payout distributed.

4.1.1 Gainsharing System Time Ordered Matrix

This section summarizes the answer to the question, "What has occurred on CMI's gainsharing system?" Table 4.1 portrays the design of CMI's gainsharing system from its conception in 1987 to September, 1994 as indicated on the following criteria:

- **Gainsharing Quarter:** the payout period for the gainsharing system;
- **Unit of Analysis:** the units (individual, group/team, organizational) that were being measured and rewarded;
- **Dollar Surplus:** the dollars available for sharing based on the change in fund balance minus the profit goal for the quarter;
- **Employee Share:** the dollars available for immediate distribution;
- **Sharing Ratio:** how the dollars available for sharing were allocated (e.g., 100/0 means all the dollars were allocated to the employee share; 50/25/25 (30%) means that 50% of the dollars were returned to CMI, 25% placed in the rainy day account, 25% allocated to the employee share with a 30% of base pay maximum individual payout);
- **Change in Fund Balance:** the difference between the dollars in CMI's cash accounts at the beginning of the period and the end of the period;
- **Percentage of Payroll:** the total payout divided by the total base pay for the participants;
- **Membership:** the requirements of eligibility in the system;
- **Number of Participants:** the number of participants in the gainsharing system;
- **Average Payout:** the total gainsharing payout divided by the number of participants;
- **LOE:** the level of effort (average monthly number of hours worked during the gainsharing period) divided by the average monthly number of full time equivalents;

- **Gainsharing Formula:** the formula employed to determine the dollar surplus;
- **Distribution Formula:** the formula employed to determine the allocation of the employee share;
- **Significant Activities:** activities that impacted or were related to the gainsharing system;
- **Changes Since Last Quarter:** changes in the design of the gainsharing system (e.g., change in the sharing ratio or distribution formula); and
- **Environmental Influences:** business influences on the gainsharing system (e.g., the gain or loss of a large project).

One important output of the time ordered matrix is the extraction of key changes. Key changes are those interventions or changes to the gainsharing system design that I perceived to possibly have an impact on the performance of the gainsharing system. Key changes to the gainsharing system that I have identified have been bolded. The key changes feed directly into section 4.1.2 which describes the circumstances and impact of each key change on the gainsharing system.

Table 4.1: Gainsharing System Time Ordered Matrix

Gainsharing Quarter	July - August/87	Sept. - Dec./87	Jan. - Feb./88	Mar. - June/88	July - Sept./88
Unit of Analysis	Center	Center	Center	Center	Center/ Individual
Dollar Surplus	\$5,541	\$2,341	\$1,095	\$103,832	\$60,822
Employee Share	\$5,541	\$2,341	\$1,095	\$14,987	\$6,541
Sharing Ratio	100/0	100/0	100/0	50/25/25 (ceiling 30%)	50/25/25(30)
Change in Fund Balances	\$41,569			\$161,476	\$60,822
Percentage of Payroll	28%			23%	15%
Membership	• Admin. staff + GRAs	no change	no change	no change	no change
Number of Participants	10	11	13	15	15
Average Payout	\$554	\$213	\$84	\$999	\$436
LOE	N/A	N/A	N/A	N/A	N/A
Gainsharing Formula	(Change in fund balances)-(profit goal)=Gainshare Amount			• 50/25/25 ratio impl. (30% ceiling)	no change
Distribution Formula	Equitable share (based on % of payroll)			no change	• Equitable & Equal + Dir. Right
Significant Activities					
Changes Since Last Quarter	• Gainsharing Experiment Begins			• 50/25/25 (30% ceiling)	• Equitable pay share (58), Equal Pay share (42)
	• Equitable pay share (100% of distribution)				• Equal pay share impl.
					• Dir. right to hold GS for <ind. APL
Environmental Influences	• GRAs pay reduced 10% (\$10/hr.) during the gainsharing period.			• Rhodia Project	
	• NOS Indian Head Project				
	• Marshall Space Flight Center Project				

(Assumption: if notice of a change in any of the gainsharing criteria is not given on a memo (or if a memo was not found) then it is assumed that no change occurred.)

Table 4.1: Gainsharing System Time Ordered Matrix (Continued)

Gainsharing Quarter	Oct. - Dec./88	Jan. - Feb./89	Jan. - June/89	July - August/89	Sept. - Nov./89
Unit of Analysis	Center/Ind.	Center/Ind.	Center/Ind.	Center/Ind.	Center/Ind.
Dollar Surplus	\$16,050	\$0	?	\$0	\$37,072
Employee Share	\$5,950	\$0	\$5,029	\$0	\$12,758
Sharing Ratio	50/25/25(30)	50/25/25(30)	50/25/25(30)	50/25/25(30)	50/25/25(30)
Change in Fund Balances	\$82,092	(\$37,403)	?	(\$78,306)	\$115,378
Percentage of Payroll	15%	N/A	4%	N/A	21%
Membership	no change	no change	• Pro-rated eligibility	no change	• Anyone below Assist. Dir. working over 20 hrs./wk.
Number of Participants	16	16	17	14	15
Average Payout	\$372	\$0	\$296	\$0	\$851
LOE	N/A	N/A	N/A	N/A	N/A
Gainsharing Formula	• Ind. peer nomination impl.	no change	no change	no change	no change
Distribution Formula	• Base (43), Equal (27), Ind. (30)	no change	• Equitable (45), Equal (25.5), Ind. (29.5)	no change	• Equal (25.5), Proportional/base pay (47), Ind. (27.5)
Significant Activities					• Gainsharing Primer published (GS education and training manual)
Changes Since Last Quarter	• Ind. peer nomination impl.		• Incorporated 1-2/89 period		• Equal (25.5), Proportional/base pay (47), Ind. (27.5)
	• Base (43), Equal (27), Ind. (30)		• Equitable (45), Equal (25.5), Ind. (29.5)		
Environmental Influences		• Loss of NOS Indian Head			
		• Dept. shifted costs (e.g., mail, phone) to CMI			

Table 4.1: Gainsharing System Time Ordered Matrix (Continued)

Gainsharing Quarter	Dec. - Jan./90	Feb./90 - June/91	July - Dec./91	Jan. - March/92	Apr. - June/92
Unit of Analysis	Center/Ind.		Center/Team/Ind.	Center/Team/Ind. (ytd)	Center/Team/Ind. (ytd)
Dollar Surplus	\$0	No gainsharing due to negative fund balance.	\$44,374	\$50,600	\$35,115 -
Employee Share	\$0		\$10,400	\$7,180	Overshared in previous quarter
Sharing Ratio	50/25/25(30)		50/25/25(30)	50/25/25(30)	50/25/25(30)
Change in Fund Balances	(\$1,729)		\$44,374	\$125,600	\$110,115
Percentage of Payroll	N/A		9%	15%	N/A
Membership	no change		no change	no change	no change
Number of Participants	15		18	13	13
Average Payout	\$0		\$578	\$552	\$0
LOE	N/A	N/A	169	213	206
Gainsharing Formula	no change		• Fund balance used instead of Net Income	no change	
Distribution Formula	no change		• Equal, Equitable, Team, Seniority + Dir. adjust.	• Equal, Equitable, Team, Seniority + DSS adjust.	
Significant Activities				• SMG voted to share only \$7000	
Changes Since Last Quarter			• Equal (35), Equitable (27), Team (18), Seniority (20)	• Equal (40), Equitable (25), Team (17), Seniority (18)	
			• Director adjustment column added	• YTD perspective used	
			• Team share added		
			• Seniority share added		
Environmental Influences		• DOE begins (11/90)			
		• Rhodia Ends			
		• Gainsharing System Designer Exits Center			

Table 4.1: Gainsharing System Time Ordered Matrix (Continued)

Gainsharing Quarter	July - Sept./92	Oct. - Dec./92	Jan. - March/93	Apr. - June/93	July - Sept./93
Unit of Analysis	Center/Team/Ind.	Center/Team/Ind.	Center/Team/Ind.?	Center/Ind.	Center/Team/Ind.
Dollar Surplus	\$4,600	\$53,500	\$0	(\$3,633)	\$40,750
Employee Share	\$2,300	\$6,620	\$2,543	\$2,572	\$10,110
Sharing Ratio	50/50	50/50 (w/ Dir. adjust.)	N/A	N/A	50/25/25
Change in Fund Balances	\$18,543	\$91,000	(\$6,602)	\$8,867	\$91,200
Percentage of Payroll	3%	8%	4%	3%	12%
Membership	no change	no change	no change	no change	no change
Number of Participants	14	16	17	15	15
Average Payout	\$164	\$414	\$150	\$171	\$674
LOE	208	190	199	224	216
Gainsharing Formula	• Dir. assumed control of GS	no change	no change	no change	• Accounts receivables used in formula
Distribution Formula	• Equal (15), Equitable (25), SMT (15), Seniority (20), Rev. gen.(25)	• SMT (8), Seniority (not rev. gen.;12), Rev. Gen. (58), Rev. Gen. dist. (22)	• SMT share (5%)	• Equal (10), Equitable (5), Seniority (10), Rev. Gen. (50), SLT/Dir Adjust. (25)	• Equal (10), Equitable (5), Team (10; for ETD), Seniority (10), Rev. Gen. (50), BDT dist. (15)
Significant Activities		• QWL bonus used previous quarter and added to total payout			
Changes Since Last Quarter	• Rev. Gen. share added	• SMT (8), Seniority (not rev. gen.;12), Rev. Gen. (58), Rev. Gen. dist. (22)	• SMT share (5%)	• Equal (10), Equitable (5), Seniority (10), Rev. Gen. (50), SLT/Dir Adjust. (25)	• Accounts receivables used in formula
	• Equal (15), Equitable (25), SMT (15), Sen. (20), Rev gen (25)	• Rev. Gen. dist. added		• GS shared as a motivator	• Equal (10), Equitable (5), Team (10; for ETD), Seniority (10), Rev. Gen. (50), BDT adjust (15)
Environmental Influences		• Acct. data not all available	• National Grocers begins • Acct. data not all available	• Acct. data not all available • DOE ends	• Acct. data not all available

Table 4.1: Gainsharing System Time Ordered Matrix (Continued)

Gainsharing Quarter	Oct. - Dec./93	Jan. - March/94	Apr. - June/94	July - Sept./94
Unit of Analysis	Center/Team/Ind.	Team/Ind.	Team/Ind.	Center/Ind.
Dollar Surplus	\$0	\$15,914	\$13,829	\$67,926
Employee Share	\$0	\$4,450	\$10,000	\$9,600
Sharing Ratio	N/A	50/25/25	Not used	50/25/25
Change in Fund Balances	(\$209)	\$40,914	\$26,329	\$92,926
Percentage of Payroll	0%			27%
Membership	no change	no change	no change	GRAs and Part-Time Staff removed
Number of Participants	N/A	13	12	5
Average Payout	\$0	\$342	\$833	\$1,920
LOE	204	214	250	225
Gainsharing Formula	no change	no change	• Sharing ratio not used	• A/R taken out of GS formula
Distribution Formula	no change	• Distribution formula not used	no change	• Equal (20), Seniority (30), Rev. Gen. (50); part-timers removed (given bonuses instead of GS); GRAs removed (given TW instead of GS)
Significant Activities		• GRAs went to .375 FTE		• GRAs went back to .50 FTE
Changes Since Last Quarter		• Distribution determined subj.	• Sharing calculated subj.	• Part-timers taken out (bonuses instead)
				• GRAs given tuition waivers instead of GS
				• Equal (20), Seniority (30), Rev. Gen. (50)
				• A/R taken out of GS formula
Environmental Influences	• Acct. system not up	• Acct. system not up		• Botswana Project begins
		• AEGIS begins		

4.1.2 Key Changes to the Gainsharing System: A Closer Look

What follows is additional data on each of the key changes that were "pulled" from the gainsharing system time ordered matrix. The following matrix (table 4.3) portrays whether the key changes that were implemented on the gainsharing system since its creation were perceived by gainsharing system designers as impacting the system and the circumstances leading to each of the key changes. A detailed description of each of the key changes, the circumstances behind the change, and the perceived impact of the change is shown in appendix C. The perceived impact column portrays whether the key change was perceived to have a positive (+), negative (-), or no (*) effect on the gainsharing system. The circumstances column portrays a code which describes the circumstances behind the change. The circumstance codes provide only a global description of the circumstances behind the key changes. The numbers next to the key changes correspond to the order and time that the key changes are portrayed in the appendix. Note that some of the key changes are listed twice to reflect multiple circumstances. The circumstances and associated codes for each of the key changes are portrayed in table 4.2.

Table 4.2: Codes for Key Changes

Circumstance	Code
To reward performance and/or effort	R
To experiment and try something new	E
To prevent "over-payout" and enhance system stability	S
To improve distribution equity	D
To provide performance feedback	P
To boost morale	M

Table 4.3: Overall Perception of the Effect of Key Changes

Key Change Identified	Time of Change	Circumstances	Perceived Impact
1) Startup of the gainsharing experiment	7-8/87	E	+
1) Startup of the gainsharing experiment	7-8/87	R	+
2) Gainsharing Formula of 50/25/25 with 30% Ceiling Implemented	3-6/88	S	- +
3) Equal Pay Share Added to Distribution Formula	7-9/88	D	*
4) Director Right to Adjust Gainsharing Added to Distribution Formula	7-9/88	P	-
5) Individual Peer Nomination Added to Distribution Formula	10-12/88	D	-
5) Individual Peer Nomination Added to Distribution Formula	10-12/88	P	-
6) Director Adjustment Column Added to Distribution Formula	7-12/91	P	*
7) Self Managing Team Share Added to Distribution Formula	7-12/91	D	+
7) Self Managing Team Share Added to Distribution Formula	7-12/91	E	+
8) Seniority Share Added to Distribution Formula	7-12/91	D	+
9) Year to Date Perspective Added to Gainsharing Formula	1-3/92	S	+
10) Revenue Generator Share Added to Distribution Formula	7-9/92	D	+
10) Revenue Generator Share Added to Distribution Formula	7-9/92	R	+
11) Revenue Generator Distribution Column Added to Distribution Formula	10-12/92	P	-
11) Revenue Generator Distribution Column Added to Distribution Formula	10-12/92	R	-
12) Gainsharing Shared as a Motivator	1-3/93	M	-
13) Accounts Receivables Used in Gainsharing Formula	7-9/93	M	-
14) Distribution Determined Subjectively	1-3/94	D	+
14) Distribution Determined Subjectively	1-3/94	R	+
15) Gainsharing Bonus Pool Determined Subjectively	4-6/94	M	+
15) Gainsharing Bonus Pool Determined Subjectively	4-6/94	R	+
16) Part-Timers Removed from Gainsharing System	7-9/94	D	+
17) Graduate Students Removed from Gainsharing System	7-9/94	D	+

Table 4.4 and 4.5 portray slices of the data from table 4.3. Table 4.4 shows the perceived effectiveness of the key changes based on the circumstances behind the key change. It shows how well the gainsharing system met the challenge behind the circumstances. Table 4.5 shows each of the interventions made and whether they were perceived to result in positive, negative, or no impact.

Table 4.4: Impact of Responses to Challenges

Circumstance	Code	Negative	No	Positive
To provide performance feedback	P	3	1	
To boost morale	M	2		1
To prevent "over-payout" and enhance system stability	S			2
To experiment and try something new	E			2
To reward performance and/or effort	R	1		4
To improve distribution equity	D	1	1	6

Table 4.5: Overall Perception of the Effect of Key Changes

Key Change Identified	Time of Change	Perceived Impact
1) Startup of the gainsharing experiment	7-8/87	+
2) Gainsharing Formula of 50/25/25 with 30% Ceiling Implemented	3-6/88	+
3) Equal Pay Share Added to Distribution Formula	7-9/88	*
4) Director Right to Adjust Gainsharing Added to Distribution Formula	7-9/88	-
5) Individual Peer Nomination Added to Distribution Formula	10-12/88	-
6) Director Adjustment Column Added to Distribution Formula	7-12/91	*
7) Self Managing Team Share Added to Distribution Formula	7-12/91	+
8) Seniority Share Added to Distribution Formula	7-12/91	+
9) Year to Date Perspective Added to Gainsharing Formula	1-3/92	+
10) Revenue Generator Share Added to Distribution Formula	7-9/92	+
11) Revenue Generator Distribution Column Added to Distribution Formula	10-12/92	-
12) Gainsharing Shared as a Motivator	1-3/93	-
13) Accounts Receivables Used in Gainsharing Formula	7-9/93	-
14) Distribution Determined Subjectively	1-3/94	+
15) Gainsharing Bonus Pool Determined Subjectively	4-6/94	+
16) Part-Timers Removed from Gainsharing System	7-9/94	+
17) Graduate Students Removed from Gainsharing System	7-9/94	+

4.1.3 Level of Effort vs. Gainsharing Payout

The analysis of level of effort versus gainsharing system payout portrays the relationship between hours worked in CMI and the gainsharing payout distributed. The following data portrays the relationship between the average individual gainsharing system payout and the average gainsharing participant level of effort. The average LOE and average payout were used because the unit of analysis was the organization rather than the individual. Level of effort is the number of hours worked for CMI. The average payout was determined by dividing the total payout by the number of participants. The average level of effort was determined by taking the total number of hours worked in a given month and dividing it by the number of full time equivalents (FTEs). One FTE is equal to one full time employee. Table 4.6 portrays the data from July, 1991 (when the LOE tracking system was first implemented) to September, 1994. Note that normal LOE/FTE, for 40 hours per week and four weeks per month, would be 160 hours. Figure 4.1 portrays a line graph of the log of average LOE versus the log of average payout. The log was used to reduce the variation in the data without affecting the portrayed relationships. Figure 4.2 portrays a scatter ploy of average LOE versus average payout.

Table 4.6: LOE and Payout Data

Gainsharing Quarter	July - Dec./91	Jan. - March/92	Apr. - June/92	July - Sept./92	Oct. - Dec./92	Jan. - Mar./93
LOE/FTE (160 is normal)	169	213	206	208	190	199
Average Payout	\$578	\$552	\$0	\$164	\$414	\$150
Log LOE/FTE	2.23	2.33	2.31	2.32	2.28	2.30
Log Average Payout	2.76	2.74	0.00	2.21	2.62	2.18

Table 4.6: LOE and Payout Data (Continued)

Gainsharing Quarter	Apr. - June/93	July - Sept./93	Oct. - Dec./93	Jan. - Mar./94	Apr. - June/94	July - Sept./94
LOE/FTE (160 is normal)	224	216	204	214	250	225
Average Payout	\$171	\$674	\$0	\$342	\$833	\$1,920
Log LOE/FTE	2.35	2.33	2.31	2.33	2.40	2.35
Log Average Payout	2.23	2.83	0.00	2.53	2.92	3.28

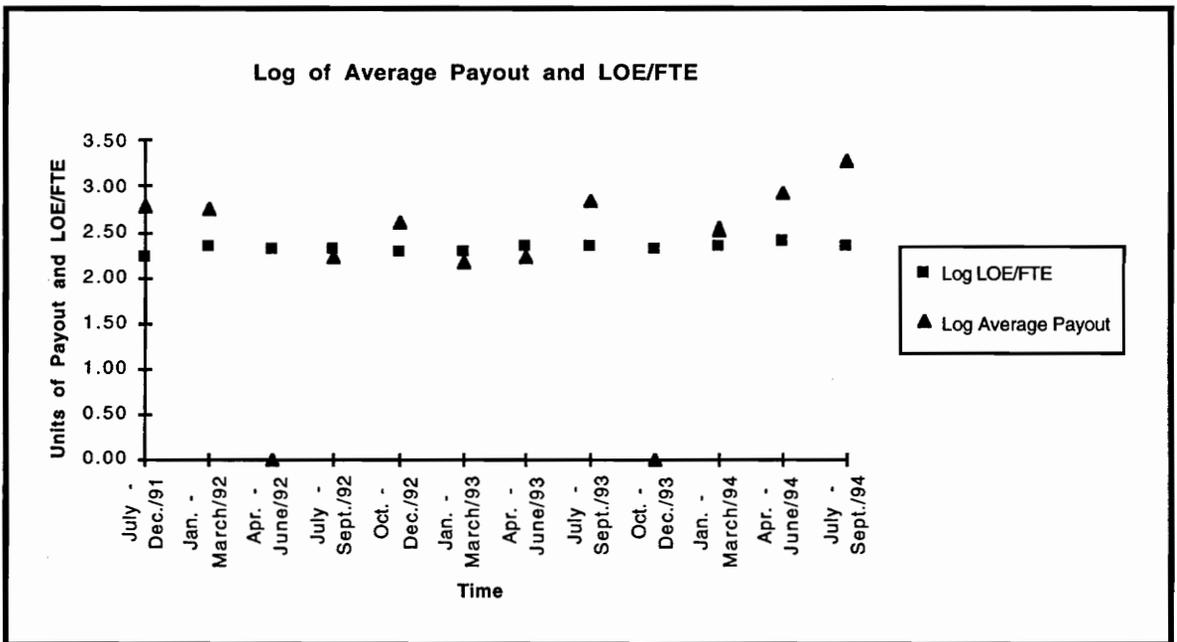


Figure 4.1: Log LOE vs. Log Average Payout

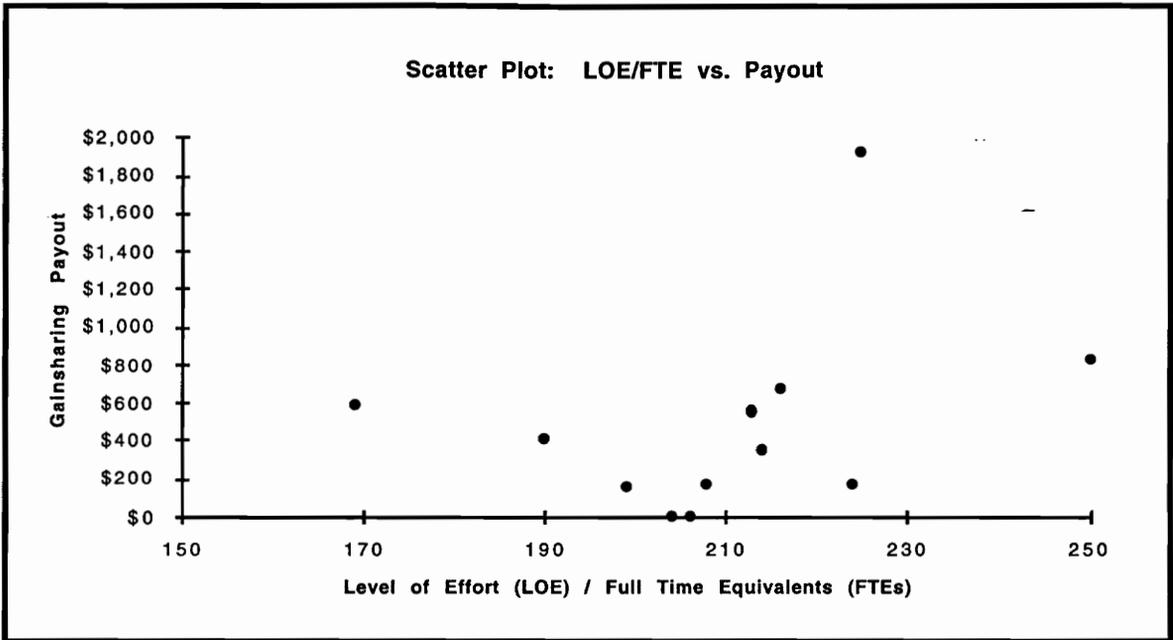


Figure 4.2: Scatter Plot: LOE/FTE vs. Payout

4.2 Aspects of the Gainsharing System that Have or Have Not Worked

The data portrayed in this section consist of the responses from the key gainsharing participants. The key gainsharing participants were those individuals identified by myself and CMI's director as having detailed knowledge of the gainsharing system based-upon their relationship with the organization. They responded to two questions: 1) As you envision CMI's gainsharing system, what aspects of that system worked and why?; and 2) As you envision CMI's gainsharing system, what aspects of that system did not work and why? Their responses have been summarized into tables 4.7 and 4.8. Their responses have also been grouped based on "natural categories" or affinity groups. The following categories (with associated codes) have been identified:

- I** implementation: how the gainsharing system was administered and utilized;
- D** design: how the gainsharing system was configured and structured; and
- O** outcome: the purpose and intent of the gainsharing system.

The summary of the number of responses in each affinity group are portrayed in table 4.9.

Table 4.7: Gainsharing Aspects that "Have Not Worked"

Aspects of the gainsharing system that were perceived as having "not worked" by key gainsharing participants	Affinity Group	P/BDT n=7	SST/RDT n=7	Total N=14
1 Frequent interventions and changes to the system.	I	6	4	10
2 The subjectively determined individual distributions.	D	3	5	8
3 Communication on financial and gainsharing system performance.	I	3	4	7
4 Linkage from performance to outcomes.	D	3	4	7
5 Individual peer nomination.	D	2	2	4
6 Interventions from director without employee participation.	I	2	2	4
7 Influencing motivation with gainsharing.	O	2	1	3
8 The rainy day account.	D	2	1	3
9 Combining the reward system with the performance appraisal system.	D	3		3
10 Using gainsharing to off-set reduced compensation.	I	3		3
11 Calling the gainsharing system a gainsharing system instead of a bonus system.	D		3	3
12 The accounting system that was used to drive the gainsharing system.	D	2		2
13 The eligibility requirements.	D		2	2
14 The revenue generator share.	D		2	2
15 Gainsharing as a motivator when the formula did not call for it.	D	2		2
16 Training on the operation of the gainsharing system.	I		2	2
17 Director being excluded from gainsharing system.	D	1		1
18 Protecting the gainsharing accounts from unexpected expenses.	I	1		1
19 The complexity of the gainsharing system.	D		1	1
20 Using gainsharing to influence attraction and retention.	O	1		1
21 Using gainsharing to improve quality of work life.	O	1		1
22 Using a participative management approach with the gainsharing system.	I		1	1
23 Managing the ongoing implementation of the gainsharing system.	I		1	1
24 Using the gainsharing system to influence individual behaviors.	O		1	1
25 Managing expectations.	I	1		1

Table 4.8: Gainsharing Aspects that "Have Worked"

Aspects of the gainsharing system that were perceived as "having worked" by key gainsharing participants	Affinity Group	P/BDT n=7	SST/RDT n=7	Total N=14
Individuals sharing in the success of the center and receiving recognition through the payouts.	O	2	3	5
Sharing information on center performance through the gainsharing memos.	D	2	2	4
Revenue generators receiving a larger share through the revenue generator share.	D	3	1	4
Using the team share to allow teams to distribute a portion of the bonuses participatively and support the team concept.	D	3		3
Improving participant knowledge of gainsharing through the experimental nature of the gainsharing system.	O	1	2	3
The rewarding of hard work.	O	1	2	3
Increasing the fairness of the system through the seniority share.	D	1	1	2
Using the equal share to motivate center level performance.	D	1	1	2
Individuals taking things more seriously because of the payouts (more performance conscious).	O	1	1	2
The move to reward hard work results instead of just hard work.	D	1		1
Linking pay to performance through the revenue generator goals.	D	1		1
Using the revenue generator distribution column to reward suppliers to the revenue generators.	D	1		1
The distribution portions (equal, equitable, seniority, team, & revenue generator).	D	1		1
Sharing on a quarterly basis.	D	1		1
Using the director adjustment column to clearly communicate adjustments.	D	1		1
Always soliciting suggestions on improving the gainsharing system to create buyin.	I		1	1
Doing quality of work life bonuses instead of gainsharing when the individual payouts were low.	I		1	1
The system enduring.	I	1		1
Sharing information on the mechanics of the gainsharing system to create line of sight.	I	1		1
The fairness of the system.	O		1	1
Using the individual peer nomination to provide individuals with feedback.	O		1	1
Providing additional income to individuals.	O	1		1
Helped people make decisions about how to spend time and money.	O	1		1

Helping the graduate students pay their tuition through the payouts.	O	1		1
Giving individuals feedback on performance through the amounts of the payouts.	O	1		1
Reinforcing the "work hard, play hard" culture.	O	1		1
Aligning the reward system to support organizational goals and objectives.	O	1		1

Table 4.9: Summary of Key Participant Perceptions

Natural Category	P/BDT	SST/ RDT	Total
Aspects of the gainsharing system that key participants have perceived as having "worked".			
Implementation	2	2	4
Design	16	5	21
Outcome	11	10	21
Total having "worked"	29	17	46
Aspects of the gainsharing system that key participants have perceived as having "not worked."			
Implementation	16	14	30
Design	18	20	38
Outcome	4	2	6
Total having "not worked"	38	36	74

4.3 Aspects of the Gainsharing System that are "Wrong" or in Need of Improvement

The data portrayed in this section consist of the responses from the current gainsharing participants. The current gainsharing participants are those individuals who were currently participating in CMI's gainsharing system as of September, 1994. They responded to two questions: 1) If applicable, what do you feel is wrong with the gainsharing system?; and 2) How do you feel the gainsharing system might be improved? Their responses have been summarized into tables 4.10 and 4.11. Their responses have also been grouped based on

"natural categories" or affinity groups. The following categories (with associated codes) have been identified:

- I** implementation: how the gainsharing system was administered and utilized;
- D** design: how the gainsharing system was configured and structured; and -
- O** outcome: the purpose and intent of the gainsharing system.

The summary of the number of responses in each affinity group are portrayed in table 4.12. Originally, the responses were also viewed by seniority and team but no relationship was indicated and have thus been left out of this section.

Table 4.10: Gainsharing Aspects Perceived as "Wrong"

Aspects of the gainsharing system that were perceived as being "wrong" by current gainsharing participants	Affinity Group	Total N=10
High degree of gainsharing system change.	I	8
Lack of relationship between individual performance and bonus outcomes.	D	5
Communication of financial performance is not frequent enough.	I	3
System is too complicated.	D	3
Using the gainsharing system to correct compensation problems.	O	2
No communication on purpose of gainsharing.	I	2
Gainsharing is not for everyone.	D	2
Seniority portion is too great.	D	1
Bonuses seems to be random.	D	1
Creating multiple rewards system for members in the organization.	D	1
Lack of system ownership and maintenance.	I	1
No training on operation of gainsharing.	I	1
Revenue generator distribution seems too subject to personal bias.	D	1
Gainsharing system does not motivate performance.	O	1
Gainsharing is not equitable.	O	1
Handling the distribution behind closed doors.	I	1
Gainsharing seems to be done at the expense of other types of recognition.	I	1
Gainsharing system not tied strongly enough into the center visible management system and chartbook.	D	1
Gainsharing system is too subject to personal biases.	D	1
Components of gainsharing system not operationalized.	D	1
System has not performed consistently at a high enough level of payout.	O	1
Individuals do not understand how they can influence gainsharing.	I	1

Table 4.11: Suggestions for Improvement

Current gainsharing participant suggestions for improving the gainsharing system.	Affinity Group	Total N=10
Increase education and training on the operation of the gainsharing system.	I	5
Redesign the gainsharing system participatively.	D	4
Increase the visibility of center performance.	I	3
Study and reevaluate the need to do gainsharing.	D	2
Reduce the percentage in the seniority share.	D	1
Train individuals on how to understand the financial performance of the center.	I	1
Standardize the gainsharing system.	I	1
Create a strong linkage between performance (e.g., customer satisfaction and efficient use of time) and gainsharing.	D	1
Explore the linking of process improvements to financial bonuses to individuals and teams.	D	1
Allocate portions of the gainsharing bonus into education, training, and development pools.	D	1
Add other motivational systems and rely less on gainsharing for motivation.	I	1
Better communicate the rationalization for differences in individual payout.	I	1
Survey participants on gainsharing system affect quarterly.	D	1
Better link behaviors to business results to gainsharing payout.	D	1
Clearly portray the entire reward system which includes gainsharing.	I	1
Clearly operationally define each gainsharing system category.	D	1
Introduce more objective decision making.	D	1

Table 4.12: Summary of Current Participant Perceptions

Natural Category	Total
Aspects of the gainsharing system that current participants have perceived as "wrong".	
Implementation	17
Design	18
Outcome	5
Total "wrong"	40
Aspects of the gainsharing system that current participants have perceived as "needing improvement."	
Implementation	14
Design	13
Outcome	0
Total "needing improvement"	27

4.4 Current Participant Perceptions of the Gainsharing System

The data portrayed in this section consist of the responses from the current gainsharing participants (N=10). They responded to a 44 item questionnaire that assessed their perceptions of CMI's gainsharing system as they related to the CMI leadership team's articulated desired outcomes of the gainsharing system, suggested outcomes of gainsharing from my body of knowledge, and suggested critical enablers of gainsharing from my body of knowledge. The 44 items logically fall into five categories: commitment, critical enablers, performance, motivation, and rewards. Commitment (table 4.13) is the degree to which individuals are pledged to CMI. Critical enablers (table 4.14) are those factors suggested by my body of knowledge whose presence moderates the success of gainsharing systems. Motivation (table 4.15) is the degree to which individuals contribute greater effort and/or willingness. Performance (table 4.16) is the degree to which the dimensions of performance (e.g, profitability, productivity, teamwork) are influenced by the gainsharing system. Rewards (table 4.17) are positive outcomes that individuals receive from the gainsharing system. The sample size for the questionnaire was ten.

The results of the 44 item questionnaire are portrayed in tables 4.13 - 4.17. For each item, the following criteria were used to signal significance of a statement:

- 1) A median greater than or equal to 3.5 or less than or equal to 2.5; or
- 2) A mode greater than or equal to 4 or less than or equal to 2.

The purpose of using descriptive statistics was to determine if the central tendency of the responses were greater than or less than three (neutral or no effect). The above decision rules were used to determine if the majority of the responses differed from neutral. Plus or minus .5 for the median and plus or minus one for the mode were chosen because they

represented one unit of deviation in either direction from the neutral response. I used one unit of deviation in either direction because I believed any score not equal to three (neutral/no effect) to be significant. The mode was chosen because it is a common measure of opinion (Ott, 1993). The median was chosen because it represents the center of a distribution without being subject to extreme scores. The mean was not used as a criteria because it was too sensitive and subject to distortion due to the presence of an extreme value. I did not use the standard deviation or the range because I was interested in the central tendency, not the degree of variation. T-tests were not used due to the small population size (N=10). Histograms of the responses to each of the questions were done at the overall, team (SST, RDT, & P/BDT), seniority (greater than or less than 3 yrs. of continuous employment with CMI) units of analysis to portrayed the variation in responses.

Finally, the original articulated desired outcomes of CMI top management are presented (table 4.18) to portray which were found to be supported and which weren't based on the perceptions by current gainsharing system participants.

Table 4.13: Perceptions on Gainsharing Fostering Commitment

C1) The gainsharing system allows the center to keep good quality people at the partner level.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.8	4	4	0.79	3	Yes
C2) The gainsharing system helps cause loyalty to go above and beyond the call of duty.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.9	3	3	0.99	3	No
C3) The gainsharing system helps cause dedication to go above and beyond the call of duty.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.8	3	3	1.14	3	No
C4) The gainsharing system helps improve employee retention.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.8	3	4	1.03	3	Yes

Table 4.14: Perceptions on Gainsharing System Critical Enablers

CE1) The gainsharing system helps people see the relationship between their effort and the center's performance.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	3	3	1.42	4	No
CE2) The gainsharing system helps people see the relationship between performance (in general) and outcomes (e.g., success or failure).					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	3	3	1.16	3	No
CE3) The gainsharing system is an experiment.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.9	4	4	0.99	3	Yes
CE4) Personnel feel gainsharing is deserved.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.9	4	5	1.29	4	Yes
CE5) Personnel expect gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.1	4	5	0.88	2	Yes
CE6) The gainsharing system bonus is equitably distributed.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.1	4	4	1.29	3	Yes
CE7) The gainsharing system was originally developed using a credible development process.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.1	3	3	0.32	1	No
CE8) The gainsharing bonus calculation is understandable.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	4	4	1.42	4	Yes
CE9) Personnel control the gainsharing bonus amount.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.2	3	2	1.23	3	No
CE10) A quarterly gainsharing bonus is timely.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.2	4	4	0.63	2	Yes
CE11) The gainsharing system is well maintained.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.2	3	3	0.92	3	No
CE12) There are adequate opportunities to influence the gainsharing bonus.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	3.5	4	1.06	3	Yes

Table 4.15: Perceptions of Gainsharing System Influence on Motivation

M1) The gainsharing system helps the center better manage the motivation sub-system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.7	4	4	.67	2	Yes
M2) The gainsharing system helps sustain motivated performance levels.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	3	3	0.95	3	No
M3) Personnel work harder as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.9	3	3	0.88	3	No
M4) The gainsharing system helps cause willingness to go above and beyond the call of duty.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.2	3	3	1.14	4	No

Table 4.16: Perceptions on Gainsharing Enhancing Performance

P1) The gainsharing system allows the center to cover their downside by reducing labor costs without having to consistently resort to layoffs.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.2	3	3	0.92	3	No
P2) The gainsharing system allows the center to be competitive.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.6	4	4	0.97	3	Yes
P3) The gainsharing system provides center personnel with information on how the center is doing/performing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4	4	4	1.15	4	Yes
P4) Employees experience improved quality of work life as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.4	3.5	4	0.97	3	Yes
P5) Personnel are more motivated to pursue/internalize methods by which to improve performance as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.7	2.5	2	1.06	3	Yes
P6) Personnel seek out ways to make the center more productive as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.7	3	3	0.82	3	No
P7) Personnel act out ways to make the center more productive as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.8	3	3	0.92	3	No

P8) The gainsharing system helps morale.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4	4	4	0.67	2	Yes
P9) Personnel are more productive as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.9	3	3	1.10	4	No
P10) Personnel try harder to keep the center profitable as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.3	3.5	4	1.16	4	Yes
P11) Personnel are more efficient as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.5	3	3	0.97	3	No
P12) Personnel are more effective as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.7	3	3	0.95	3	No
P13) The gainsharing system makes personnel more customer-focused.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.9	3	3	0.99	3	No
P14) Personnel work smarter as a result of the gainsharing system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.7	3	3	0.95	3	No
P15) Product quality is enhanced as a result of gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.5	3	3	0.71	2	No
P16) Personnel are more innovative as a result of gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.5	3	3	0.71	2	No
P17) Communication is enhanced as a result of gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.8	3	3	0.92	3	No
P18) Teamwork is enhanced as a result of gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
2.6	3	3	0.84	3	No

Table 4.17: Perceptions of Gainsharing System Rewards

R1) The gainsharing system is an essential part of the partner's equity system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.8	4	4	1.32	4	Yes
R2) The gainsharing system supplements the state's compensation system.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.4	4.5	5	0.70	2	Yes
R3) The gainsharing system allows people to share in the success of the center. When the organization wins, the people win.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.2	4.5	5	1.03	3	Yes
R4) The gainsharing system allows people to be rewarded with variable compensation for consistent performance above acceptable levels.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
3.4	4	4	1.17	4	Yes
R5) Personnel are delighted by gainsharing.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.1	4	4	0.99	3	Yes
R6) Personnel are pleased that they are receiving some of the gains of teamwork.					N=10
Mean	Median	Mode	Std. Dev.	Range	Significant
4.5	4.5	4	0.53	1	Yes

Table 4.18: Summary of Support for Gainsharing Desired Outcomes

Goal	Support ?
1) The gainsharing system allows the center to cover their downside by reducing labor costs without having to consistently resort to layoffs.	No
2) The gainsharing system allows the center to be competitive.	Yes
3) The gainsharing system allows the center to keep good quality people at the partner level.	Yes
4) The gainsharing system is an essential part of the partners' equity system.	Yes
5) The gainsharing system provides center personnel with information on how the center is doing/performing.	Yes
6) The gainsharing system helps the center better manage the motivation sub-system.	Yes
7) The gainsharing system supplements the state's compensation system.	Yes
8) The gainsharing system helps people see the relationship between their effort and the center's performance.	No
9) The gainsharing system helps people see the relationship between performance and outcomes (e.g., success or failure).	No
10) The gainsharing system allows people to share in the success of the center. When the organization wins, the people win.	Yes
11) The gainsharing system allows people to be rewarded with variable compensation for consistent performance above acceptable levels.	Yes
12) The gainsharing system is an experiment.	Yes
13) Employees experience improved quality of work life as a result of the gainsharing system.	Yes
14) Personnel are more motivated to pursue/internalize methods by which to improve performance as a result of the gainsharing system.	(NO)
15) Personnel seek out ways to make the center more viable as a result of the gainsharing system.	No
16) Personnel act out ways to make the center more viable as a result of the gainsharing system.	No
17) The gainsharing system helps morale.	Yes
18) Personnel are more productive as a result of the gainsharing system.	No
19) Personnel try harder to keep the center profitable as a result of the gainsharing system.	Yes
20) Personnel are more efficient as a result of the gainsharing system.	No
21) Personnel are more effective as a result of the gainsharing system.	No
22) The gainsharing system makes personnel more customer focused.	No
23) Personnel feel gainsharing is deserved.	Yes
24) Personnel expect gainsharing.	Yes
25) Personnel are delighted by gainsharing.	Yes
26) Personnel are pleased that they are receiving some of the gains of teamwork.	Yes
27) The gainsharing system helps sustain motivated performance levels.	No
28) The gainsharing system helps cause loyalty to go above and beyond the call of duty.	No
29) The gainsharing system helps cause dedication to go above and beyond the call of duty.	No
30) The gainsharing system helps cause willingness to go above and beyond the call of duty.	No
31) Personnel work harder as a result of the gainsharing system.	No
32) Personnel work smarter as a result of the gainsharing system.	No
33) The gainsharing system bonus is equitably distributed.	Yes

(Note: N=10)

Chapter 5 - Discussion and Conclusions

5.0 Discussion and Conclusions Overview

The purpose of the discussion and conclusions chapter is to convert the data I analyzed in chapter 4 into information that can then be used to make decisions which will be portrayed in chapter 6. This chapter consists of answering my research questions.

5.1 Research Question #1

How has CMI's gainsharing system design evolved from startup to present?

Based on the data portrayed in table 4.1 (the gainsharing system time-ordered matrix), the CMI leadership team have experimented with different interventions on the gainsharing system since its conception in 1987. Their initial gainsharing design had five key characteristics: membership, measurement system, bonus calculation, bonus division, and information sharing. Membership in the gainsharing system consisted of all members of CMI with the exception of the director. The measurement system tracked profitability by determining the change in cash accounts from quarter to quarter. The bonus calculation involved determining the change in cash accounts for a given quarter, subtracting out the profit goal for the quarter, and allocating the remainder to the gainsharing bonus pool. The bonus division called for an equitable distribution. The bonus was divided as a percentage of the employee's base pay. Information sharing involved the distribution of a gainsharing memo describing the financial data used to determine the gainsharing amount, an

explanation of the business situation for the past quarter, and a projection of what the future quarter would look like. The gainsharing system was designed without the use of external experts as the director and one of the graduate students were in-house experts. Employees were consulted prior to, during, and after implementation.

In 1988, four key changes were introduced to the gainsharing system: the 50/25/25 (30%) gainsharing formula, equal pay share, director right to withhold gainsharing, and the individual peer nomination. The 50/25/25 (30%) gainsharing formula (also called the sharing ratio) was implemented to control the magnitude of the dollars being shared and introduce greater fiscal control. Previously 100% of the dollars in the gainsharing bonus pool were immediately shared, the 50/25/25 (30%) called for immediately sharing 25%, allocating 25% to a "rainy day" account (for future distribution in lean quarters), and returning 50% to CMI. The 30% was the bonus ceiling individuals could receive (e.g., individuals could not receive a bonus greater than 30% of their base pay). The equal pay share was done to make the system more egalitarian and involved distributing a portion of the bonus pool equally among the participants. The director right's to withhold gainsharing was done to better control the level of individual performance and was implemented by removing individuals from the gainsharing system if they performed below acceptable levels of performance. The individual peer nomination was done to combine the performance feedback system with the gainsharing system and was implemented by having all center employees rate each other on feedback forms, averaging the forms, and using the individual scores to allocate a portion of the bonus pool.

During the 1989 and 1990 time period, no key changes were introduced. Some minor changes in 1989 included pro-rated eligibility (CMI employees must be employed over three months before they were eligible for gainsharing) and a modification to the

membership such that assistant directors were not eligible to receive gainsharing. In 1990 (and the first half of 1991) CMI lost a major grant and was unable to gainshare. A key personnel loss occurred in the 1990/91 time period when the graduate student designer of the CMI gainsharing system exited CMI. The effect of that loss was that CMI lost the person who best understood the research and theory behind the gainsharing system. The following year their business recovered and they continued their gainsharing system experiment.

At the end of 1991, once CMI's business had recovered such that they could engage in gainsharing, they introduced three key changes: team share, seniority share, and the director adjustment column. The team share was introduced to support the establishment of self managing teams within the center. The team share involved allocating a portion of the bonus pool to the teams themselves to distribute how they saw fit. The seniority share was introduced to foster retention of employees by rewarding seniority. The seniority share allocated a portion of the bonus pool, based on the months of seniority a participant had, as a percentage of the total months of seniority for all participants. The director adjustment column was done to portray modifications in the individual gainsharing bonuses due to director perceptions of individual performance. Also, once CMI was able to gainshare, they removed the individual peer nomination from the gainsharing system.

In 1992, CMI introduced three key changes: year-to-date perspective, revenue generator share, and revenue generator distribution. The year-to-date perspective was added to stabilize the gainsharing system and ensure annual, rather than quarterly, financial performance. This was done by looking at the entire year, rather than just the last quarter, to prevent sharing large sums of money in a good quarter and resulting in a net loss for the year end. The revenue generator share was done to reward the revenue generators in the

center and involved allocating a portion of the bonus pool based upon the % completion of the revenue generator's goals. The revenue generator distribution was done to strengthen the internal customer-supplier relationship between the revenue generators and the staff/graduate students. This was done by allocating a portion of the bonus pool to the revenue generators to distribute to those who had contributed to their success.

In 1993, CMI introduced two key changes: gainsharing as a motivator and accounts receivables used in the gainsharing formula. Gainsharing as a motivator involved sharing dollars when the formula did not call for it and was done to give participants a morale boost. Adding accounts receivables to the gainsharing formula was done to decrease the time lag between the work that was done and the gainsharing reward. Also, the revenue generator distribution was discontinued.

In 1994, CMI introduced four key changes: subjective distribution, subjective calculation, removal of part-time employees, and the removal of graduate students. The subjective distribution was done to prevent key people from exiting the system and involved distributing the bonus without the use of the traditional distribution formulas. The subjective calculation was done to provide an "advance" on the future quarter and involved determining the size of the bonus pool without the use of the gainsharing formula. The removal of part-time employees (they were given bonuses instead) was done to recognize the differences between full and part-time employees. The removal of graduate students was done because CMI could not afford to provide the graduate students with tuition waivers (the larger system required that graduate students receive tuition waivers) and gainsharing.

As of May, 1995, CMI is involved in re-engineering their entire gainsharing system. The prior year had shown that the gainsharing system was not aligned with changes in CMI as demonstrated by the need to deviate from their formulas. Recent changes to the system include the removal of the partners (individuals comprising the GSS* professional practice) from the gainsharing system, objectively defining the criteria behind the revenue generating share, and re-evaluating the need to continue with the gainsharing experiment.

What has worked and what has not?

Based the data portrayed in table 4.1 (the gainsharing time ordered matrix), table 4.3 (perceptions on the effect of key changes), figures 4.1 & 4.2 (diagrams on the relationship between level of effort and average gainsharing payout), table 4.7 (aspects of the gainsharing system perceived as having "not worked"), table 4.8 (aspects of the gainsharing system perceived as having "worked") I have concluded that there exists several gainsharing system aspects that may be characterized as having "worked" or "not worked."

Aspects of the gainsharing system that I believe have "worked" are the following:

- *Efforts to improve distribution equity.* The majority of the interventions that were perceived to be made to improve the distribution equity (e.g., seniority share, team share, equal pay share) tended to affect the gainsharing system positively.
- *Efforts to reward performance and/or effort.* The majority of the interventions that were perceived to be made to better reward performance and/or effort (e.g., the gainsharing system startup and revenue generator share) tended to affect the gainsharing system positively.

- *Individuals sharing in the success of the center and receiving recognition through the payouts.* Individuals perceived that the gainsharing system bonuses allowed them to feel connected to the center such that when the organization won, the people won. They also felt that receiving recognition through the payouts "worked." Several individuals enjoyed the celebration atmosphere that occurred when the checks were distributed.
- *Sharing information on center performance through the gainsharing memos.* Individuals perceived that the gainsharing system memos provided them with information on the performance of the center so that they had a better understanding of the health of the organization.
- *Rewarding the revenue generators through the revenue generator share.* Individuals perceived that the move to reward those individuals who were critical to the success of the organization was a good one that "worked." They believed that the revenue generators deserved their extra bonuses due to all the travel they were asked to engage in.

Aspects of the gainsharing system that I believe have "not worked" are the following:

- *Using the gainsharing system to provide performance feedback.* The majority of the interventions that were perceived to be made to provide performance feedback to individuals through the gainsharing system (e.g., individual peer nomination and director right to withhold gainsharing) tended to affect the gainsharing system negatively.
- *The frequent interventions and changes to the system.* Individuals perceived that the frequent interventions and changes to the gainsharing system tended to cloud the performance to outcomes linkages and cause loss of trust in the system.

- *The subjectively determined distributions.* Individuals perceived that subjectively determined distributions tended to be based more on visibility rather than performance and thus undermined the credibility of the system.
- *The communications on financial and gainsharing system performance.* Individuals perceived that they did not receive enough financial and gainsharing system information. They stated that quarterly information was not timely. They believed that if they could better predict the gainsharing system payouts, based on frequent updated information, then the payouts would be more motivational rather than an unexpected but welcomed bonus.
- *The linkage of performance to outcomes.* Individuals did not perceive a strong linkage between their own performance and the outcomes they received through the gainsharing system.
- *The individual peer nomination.* Individuals perceived that the individual peer nomination resulted in a negative effect on the gainsharing system. Several individuals commented that combining rewards and feedback was against the teachings of total quality management and that the pain associated with ranking their peers was more costly than the benefits they received in feedback and payout. Many individuals rated their peers equally so the individual peer nomination became similar to the equal distribution share. The individual peer nomination was removed from the gainsharing system in the 1990/91 time period.
- *Interventions from the director without employee participation.* Individuals perceived that interventions from the director without employee participation tended to result in reduced employee buy-in and acceptance of the introduced changes.
- *Fostering increased effort through the payouts.* Though individuals perceived that the payouts helped them feel more connected to CMI, they did not perceive that the payouts encouraged them to work "harder." Of all the aspects found to "work" or "not work,"

this aspect goes against the literature and research on gainsharing and reward systems. Possible reasons to explain this anomaly may be that the instruments used were not sensitive enough, the employees were already working at satiation due to non-gainsharing reasons, and/or the data used in the average LOE/FTE versus gainsharing payout charts (figures 4.1 and 4.2) were aggregated at the organizational level. The questionnaire may not have been sensitive enough because the right questions were not asked. Employees may have been at satiation because, including vacation and holidays, CMI employees on the average work in excess of 50 hours per week. Average employees, not including vacation and holidays, work 40 hours per week. Finally, a relationship between effort and gainsharing system payout may have been detected had the data been analyzed at the individual, rather than the organizational, level.

5.2 Research Question #2

After eight years of implementation, does it appear that the gainsharing system is effective?

Based on my data and analysis, I believe that CMI's gainsharing system is effective. In particular, I believe that CMI's gainsharing system is perceived to be effective in contributing to the CMI leadership's goals in the areas of commitment, performance, and rewards. The goals are:

- employee retention,
- CMI profitability, budgetability, and competitiveness,
- quality of work life and morale,
- information sharing,
- sharing in organizational success,

- enhancement of compensation and equity,
- rewarding performance, and
- sharing in the gains of teamwork.

The gainsharing system's contribution to the goals are moderated by the perceived-presence of the following critical enablers:

- perception of the gainsharing system as an experiment,
- gainsharing being expected and deserved,
- bonuses being equitably distributed,
- an understandable and influenceable bonus, and
- a timely bonus (quarterly).

Keeping in mind that the system is an experiment, I believe that by simply enduring, the system has been a success. White (1979) used retainment vs. abandonment as one of his criteria of success for the gainsharing plans he studied. An ineffective experiment would have been abandoned years ago.

At this point I would like to address the specific articulated outcomes of CMI leadership on the gainsharing system. Data show that 17 of the 33 outcomes were perceived to be supported, only 1 of the 33 outcomes were perceived to hindered (marginally significant and could have been due to statistical variation), and 15 of the 33 outcomes were perceived to have no affect as a result of the gainsharing system. One might make the argument that since all 33 of the outcomes were not met, that the gainsharing system is ineffective. I have chosen to view the glass of water (the gainsharing system) as half full rather than half empty. The CMI leadership team's goals were extremely ambitious. In my review of the literature, I did not encounter a single study that documented a gainsharing system that

would have met all of their articulated desired outcomes. Given that the system is effective now, the challenge for the future is to improve the system such that *all* goals are met.

5.3 Research Question #3

What does the gainsharing system design for a small, R&D, public sector organization look like?

This question will be answered in the following chapter on recommendations. I will discuss what I believe the gainsharing design for a small, R&D, public sector organization *should* look like.

5.4 Research Question #4

Is there a perception that the following critical enablers (a credible gainsharing system design, an understandable bonus, an influenceable bonus, a timely bonus, involvement opportunities, and gainsharing system maintenance) from the literature are in place?

Data (table 4.14) indicated weak support for the presence of critical enablers as only the following critical enablers were perceived to be supported:

- the gainsharing bonus calculation is understandable (histograms showed that individuals with seniority and individuals on the P/BDT agreed more strongly);
- a quarterly gainsharing bonus is timely; and
- there are adequate opportunities to influence the gainsharing bonus.

The data showed that individuals did not know whether the gainsharing system was designed using a credible process (may be a non-issue given the system has been in place for over seven years) or whether the system was well maintained.

Two additional critical enablers that I tested for were that gainsharing was deserved and that gainsharing was expected. I found support for both statements which indicated to me that current participants did not believe they were overjustified by the gainsharing system payouts.

5.1.5 Research Question #5

Is there a perception that CMI's gainsharing system results in improved performance on the dimensions of effectiveness, profitability/budgetability, efficiency, productivity, quality, quality of work life, communication, teamwork, and innovation?

Data (table 4.16) indicated mixed support for the perception that the gainsharing system influences performance. Current gainsharing participants perceived that:

- the gainsharing system allows the center to be competitive (individuals without seniority seem to more strongly agree);
- the gainsharing system provides center personnel with information on how the center is doing/performing;
- employees experience improved quality of work life as a result of gainsharing;
- personnel are *less* motivated to pursue/internalize methods by which to improve performance as a result of the gainsharing system;
- the gainsharing system helps morale; and
- personnel try harder to keep the center profitable as a result of gainsharing.

The literature states that the following dimensions of performance improve as a result of gainsharing: effectiveness, efficiency, profitability/budgetability, productivity, communication, teamwork, quality, quality of work life, and innovation. Current gainsharing participants perceived the gainsharing system to contribute to the quality of work life dimension (QWL, morale) and the profitability/budgetability dimension (competitiveness, profitable). The communication dimension received some support as individuals perceived the gainsharing system to provide information on how the center is doing/performance. However, individuals did not perceive communication as a whole to be supported by the gainsharing system. The innovation dimension seemed to be slightly hindered by the gainsharing system as individuals perceived they were less motivated to

pursue and internal methods to improve performance. However, the other four statements on innovation (P6: seek ways to improve, P7: act out ways to improve, P14: work smarter, P16: more innovative; see table 4.16) showed no hindrance (or support) as a result of the gainsharing system. The other dimensions (efficiency, effectiveness, productivity, teamwork, and quality) were perceived to not be impacted by the gainsharing system.

5.6 Research Question #6

Is there a perception that CMI's gainsharing system rewards personnel?

Data (table 4.17) indicated support that the gainsharing system is rewarding as 6 out of 6 of the statements in the reward category were supported. Current gainsharing participants perceived that the gainsharing system:

- is an important part of the partner's equity system (histograms indicated that P/BDT and SST more strongly agreed than RDT);
- supplements the larger organization's compensation system;
- allows people to share in the success of the center. When the organization wins, the people win;
- allows people to be rewarded with variable compensation for consistent performance above acceptable levels;
- participants are delighted by gainsharing (histograms indicated that SST members more strongly agreed); and
- participants are pleased that they are receiving some of the gains of teamwork.

5.7 Research Question #7

Is there a perception that CMI's gainsharing system fosters loyalty and commitment?

Data (table 4.13) showed weak support that CMI's gainsharing system fosters loyalty and commitment. Individuals perceived that the gainsharing system supports employee retention overall and specifically at the partner level. The histograms in Appendix D indicated that SST members perceived the gainsharing system to foster greater partner level retention than the RDT or P/BDT. Individuals did not perceive that the gainsharing system hinders loyalty or dedication to go beyond the "call of duty." Overall, the gainsharing system seems to foster loyalty but not necessarily commitment.

5.8 Research Question #8

Is there a perception that CMI's gainsharing system sparks greater effort and motivation?

Data (table 4.15) indicated very weak support that the gainsharing system influences motivation. Current gainsharing participants perceived that the gainsharing system allows CMI to better manage the motivation front but they did not perceive that the gainsharing system allowed them to better sustain motivated performance levels, work harder, or cause willingness to go above and beyond the "call of duty." These results are consistent with the data on level of effort versus average gainsharing system payout (table 4.6 and figures 4.1 and 4.2).

5.9 Research Question #9

How might CMI's gainsharing system be improved?

This research question is answered in the following chapter on recommendations.

5.10 Limitations to the Study

As with any study, there always exist limits on the degree to which results and conclusions can fully be accepted. With respect to my study, there exist limitations due to the type of research that I employed and the nature of my data. The research type I used was formative evaluation. The purpose of formative evaluation research is to improve the intervention being studied, but it is not meant to be applied beyond that setting. Thus, my study is not fully generalizable to other gainsharing applications. The other limitation to my study is the nature of the data. The data is primarily based on the perceptions of gainsharing designers and participants (with the exception of the gainsharing history and LOE vs. payout data). Perceptions are both a weakness as well as a strength. It is a weakness because perceptions are dynamic and do not necessarily represent "reality." Because something is perceived to exist does not make it real. A different set of participants may have formed completely opposite perceptions which is another reason why this study is not fully generalizable. The strength of perceptions is that they may be more "real" than the reality itself. If participants perceive the gainsharing system payouts to be rewards then the payouts are rewards regardless of whether outsiders looking in believe the payouts are a subtle form of punishment (e.g., Alfie Kohn, 1993).

Chapter 6 - Recommendations

6.0 Recommendations Overview

The purpose of the recommendations chapter is to state my recommendations to improve CMI's gainsharing system and state recommendations for CMI-type organizations that are considering gainsharing. My recommendations are based on my results, conclusions, and body of knowledge. Chapters one through five was the research (study and evaluation) portion of this thesis. Chapter six is the reduction and application of that research to the CMI's gainsharing system. My body of knowledge has provided me with a goal of where gainsharing systems *can* be. My conclusions have provided me with information on where CMI's gainsharing system is *now*. My recommendations will be geared toward closing that gap. Also, a component of my results contained data on current gainsharing participant suggestions for improving the gainsharing system. Their suggestions will be integrated into my recommendations. I believe their suggestions are particularly relevant as six out of ten of the current gainsharing participants are management systems engineers and thus knowledgeable of organizational performance improvement and total quality management. My recommendations to CMI-type organizations will consist of ideas I believe should be considered prior to engaging in gainsharing.

6.1 Research Objectives

In chapter one, I stated the research objectives of this thesis. In a sense, the research objectives are the deliverables of this study. This study has two primary customers: my committee members who will ensure the document is worthy of a research publication and the managers and leaders of CMI who will use this document to improve their gainsharing system. Chapter five was focused on answering my research questions and was written to satisfy my committee members. In chapter five the focus was on the study and evaluation components of this research study. Chapter six is focused on meeting my research objectives and is written to satisfy the managers and leaders of CMI. In chapter six, the focus is on the recommendation(s) component of this research study. The following were my research objectives.

- 1) Document the evolution of CMI's gainsharing system from its conception in 1987 to the present.
- 2) Evaluate CMI's present gainsharing system to determine whether it is meeting its desired outcomes.
- 3) Construct a list of what has or has not worked based upon CMI's eight years of gainsharing experience.
- 4) Generate recommendations on how the gainsharing system can be improved based on the body of knowledge and conclusions.

Research objectives #1, #2, and #3 were completed and portrayed in chapter five (section 5.1 - 5.8). Chapter six is devoted to research objective #4 and will be discussed throughout the rest of this chapter. Combined, these four objectives represent my deliverables to CMI.

6.2 Recommendations to CMI

In chapter five, I stated that I believed the gainsharing system to be successful and effective. However, that does indicate that the system can't be improved. Based on my evaluation, CMI's gainsharing system is not perceived to be fostering leadership goals in the areas of commitment, increased effort/motivation, innovation (through performance improvement efforts), teamwork, product quality, efficiency, effectiveness, and productivity. Also, individuals do not perceive a performance to outcomes linkage and do not perceive that the gainsharing system is well-maintained. The items just listed represent the gap between actual and desired results. The following are my recommendations on how to close the gap. The format for each recommendation is to state the problem, the recommendation, and the anticipated benefits to the CMI gainsharing system and CMI overall.

1) Use the rainy day account as intended.

Problem: Currently, the rainy day account component of the gainsharing formula is not being used as intended. The rainy day account was designed as a mechanism to reduce the payout variation in the gainsharing system. CMI's business environment is subject to a great deal of variation that is often beyond the control of the individuals in the system. It is necessary to reward individuals for their hard work even when that hard work has not translated into short term profitability (this problem is exacerbated given the lag times in project work between actions and results). The concept of CMI's rainy day account is to save a portion of the payouts in prosperous quarters to distribute to CMIers in less than prosperous quarters. The key problem is that dollars stored in the rainy day account were not protected from unanticipated operational expenses. The problem of the rainy day account was identified as a problem by both former and current gainsharing system participants as they were receiving only 25% (rather than the stated 50%) of the

gainsharing bonus pool. Further, deviation from system design features and less than disciplined implementation often results in the erosion of system integrity. The result is lowered participant trust and satisfaction. The intention of the rainy day account is good however the implementation needs improvement. The solution to this problem is to introduce discipline into the financial management of the rainy day account and protect the dollars stored in that account.

Benefit to Gainsharing System: I believe acceptance of this recommendation will work toward stabilizing and creating faith in the gainsharing system. The gainsharing system will also produce greater rewards due to sharing 50% (25% for immediate distribution and 25% delayed) of the bonus pool.

Benefit to CMI: The primary benefit of this recommendation to CMI will be enhancement of employee satisfaction and trust due to a gainsharing system of greater stability that produces greater levels of payout. A secondary benefit will be greater motivation during quarters of low financial, but high overall, performance.

2) Make modifications to the gainsharing system participatively on an annual basis.

Problem: Many individuals expressed the concern that too many changes were being made on the gainsharing system too frequently. Thus making the gainsharing system unpredictable from the view of the participants. Without the ability to predict, participants did not view the gainsharing system as something they could depend on. Another concern is that given the experimental nature of the gainsharing system, interventions were being made without adequate data to evaluate the effects of previous interventions. Thus making it extremely difficult to assess the impact of interventions in an empirical manner. The intention of improving the gainsharing system is proper but the implementation of those making the changes and interventions can be improved. I believe the CMI leadership team

(the current owners of the gainsharing system) should establish the gainsharing system design and then only change it on an annual basis. I recommend that suggestions for improving the system (or even terminating the system) be solicited from all participants (perhaps via email and could include a gainsharing attitude survey), and then form an ad hoc committee with representatives from all teams to discuss the proposed changes. The representatives would then present these changes to the leadership team for consideration and possibly implementation.

Benefit to Gainsharing System: There are several benefits to the CMI gainsharing system. The first benefit is that due to the participative nature of the call for ideas, there will exist greater participant buy-in and the quality and quantity of ideas for improvement will be greater. The second benefit is that the gainsharing system will be more stable and predictable due to the interventions being batched. The third and final benefit is that better quality data will be available to assess the impact of the interventions on the gainsharing system.

Benefit to CMI: The primary benefit to CMI will be greater employee satisfaction and trust in the gainsharing system due to the greater stability and participation. A secondary benefit will be better decision making and research on the gainsharing system due to better quality data.

3) Increase the amount of financial and gainsharing data shared.

Problem: Many individuals expressed a desire to receive greater amounts of information on financial and gainsharing system performance. They believed that greater amounts of information would allow them to better perceive the linkages between performance and outcomes and better predict gainsharing. The intention of the leadership team was probably to prevent participants from being overwhelmed with data however participants seem to prefer to view the data themselves. CMI

has a sophisticated measurement system in place called the visible management system (VMS). Information from that system however, is not shared to all employees. My recommendation is that information from the VMS be shared with all gainsharing system participants on a monthly basis (the VMS is on a monthly cycle).

Benefit to Gainsharing System: The benefit to the gainsharing system is that individuals would be better able to perceive the performance to outcomes linkages. Also, sharing information could lead to suggestions on better linking the gainsharing system to the measurement system (VMS).

Benefit to CMI: The benefit to CMI is that sharing information from the VMS would allow participants to better understand how the center is performing and the impact they are making on the organizational system (and their influence on gainsharing). If participants believed their gainsharing was in jeopardy (and had enough lead time), then they would be more likely to go the extra mile to turn things around.

4) Offer gainsharing system training on a monthly or quarterly basis.

Problem: Several current gainsharing participants expressed the problem that they did not understand the purpose, formulas, or mechanisms of the gainsharing system. The result was that they simply accepted the payouts as nothing more than bonuses. Given the high level of education among the gainsharing system participants, it was probably assumed that the gainsharing system memos were self explanatory. The intention was probably to avoid the wasting of time on unnecessary training. My recommendation is that gainsharing system training be offered (but only delivered if the offer is accepted) on a monthly or quarterly basis. This recommendation could be implemented by offering a one or two hour training session for gainsharing system participants. Topics could include the purpose of gainsharing at CMI,

employee influences on gainsharing, the process of gainsharing, the history of gainsharing, the linkage between financial health and gainsharing, understanding financial performance, and how the gainsharing fits within the larger systems of CMI. This recommendation could be tied to the annual change recommendation so that training would be done on an annual basis after the changes were all made to maintain and refresh participant knowledge of the CMI gainsharing system.

Benefit to Gainsharing System: The benefit to CMI's gainsharing system is that individuals would better understand the gainsharing system and how they fit within that system. Also, individuals with better knowledge of gainsharing operations could formulate better ideas aimed at improving the system.

Benefit to CMI: The benefit to CMI would be that individuals would understand the purpose of the gainsharing system, how they are connected to it, and how the gainsharing system can foster win-win relationships between the center and its personnel. Employees with greater knowledge will be more likely to engage in revenue generating or cost reducing activities to boost gainsharing.

5) Create a subset of the bonus pool to reward process and system improvements.

Problem: Currently the gainsharing system is not perceived to be directly fostering process and system improvement. I recommend that 10% of the bonus pool be allocated to a cumulative "process/system improvement" pool. The pool would be used to reward any improvements made to any of CMI's processes or systems.

Individuals (not just gainsharing participants) could form teams (or use established ones) or work individually to apply improvement tools and techniques. Upon completion of their projects, they would submit their results and what they believe the impact of the improvement is on CMI. They would also state what they believe an appropriate reward would consist of (e.g., ET&D money, cash, dinner,

recognition, donation to a local charity in their name). The CMI leadership team would evaluate their results and award a cash (or nonfinancial) bonus to the team or individual responsible for making the improvement.

Benefit to Gainsharing System: The benefit to the gainsharing system is that a mechanism will be created to directly influence process and system improvement and better meet CMI leadership goals.

Benefit to CMI: The benefit to CMI is that improvements in motivation, innovation through process and system improvement, teamwork, quality, efficiency, effectiveness, and productivity (areas the gainsharing system is currently not perceived to support) are directly supported through the gainsharing system. Those improvements translate directly into enhanced organizational performance.

6) *Utilize the reorganized gainsharing files (electronic and hard copy) and maintain the gainsharing time-ordered matrix.*

Problem: Prior to this research study, the documentation on CMI's gainsharing system did not exist in an acceptable manner. One of the steps necessary in completing this research study was to reorganize CMI's electronic and hard copy gainsharing system files as well as to establish the gainsharing system time-ordered matrix (see table 4.1). My recommendation is that the reorganized files and time-ordered matrix be maintained to ensure that when the gainsharing system is evaluated in the future (perhaps as a continuation of this research study), complete files will exist and be easily accessible.

Benefit to Gainsharing System: The benefit to the gainsharing system is the establishment of a organized gainsharing documentation system.

Benefit to CMI: The benefit to CMI is that future research, study, and evaluation of their gainsharing system will be supported.

7) *Adopt my suggested gainsharing system design.*

Problem: CMI's current gainsharing system design will need to be modified to reflect the above recommendations. Based on my data and analysis of CMI's gainsharing experience and my body of knowledge, I believe that CMI should modify their gainsharing system to reflect the one portrayed in figure 6.1. Figure 6.1 is essentially the March, 1995 version of CMI's gainsharing system with the process/system improvement pool added in.

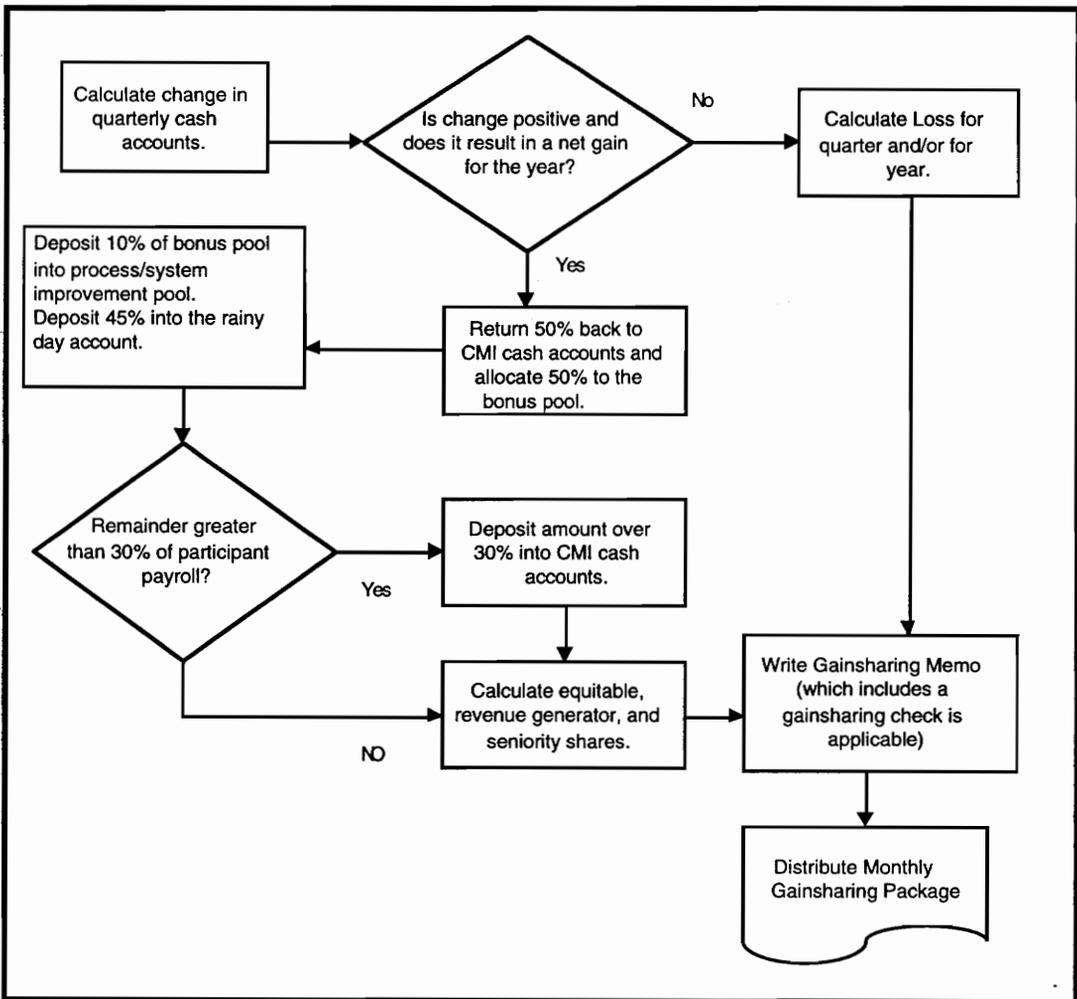


Figure 6.1: Recommended Gainsharing Process

Figure 6.1 portrays what I believe the gainsharing system design for a small, public-sector, research and development organization should look like. Similar to the current gainsharing system, the key characteristics would be: membership, measurement system, bonus calculation, bonus division, information sharing, and maintenance. The membership would be comprised of all full-time individuals with the exception of graduate students (who would receive their tuition waivers instead) and directors (who receive professional activity). The measurement system would still be based on profitability/budgetability until a more sophisticated system (e.g., wholistic VMS performance) can be developed. The bonus calculation would be 50% returned to CMI and 50% to bonus pool. 10% of the bonus pool would be placed in the process/system improvement pool to reward internal process and system improvement. The remaining 90% of the bonus would be split 50% for immediate distribution and 50% for the rainy day account for rewarding performance in non-prosperous quarters. The dollars allocated for immediate distribution would be distributed using equitable, seniority, and revenue generator shares based upon their relative value to CMI leadership. I would not use equal or team shares because they have tended to be redundant with equitable shares. Information sharing would continue to consist of the gainsharing memo and spreadsheet. Maintenance would include on-going education, training, and development, batched annual participative improvements, on-going file maintenance, and monthly information sharing through the CMI visible management system.

Benefit to Gainsharing System and CMI: This design is essentially the current CMI gainsharing system with the above recommendations factored in. The benefits of

adopting this recommendation have already been discussed in itemized fashion under each of the previously mentioned recommendations.

6.3 Recommendations to CMI-Type Organizations

Although my research study is not fully generalizable beyond this specific case study, there are some recommendations based on my results and my body of knowledge that I believe are applicable to CMI-type organizations who are considering implementation of gainsharing. At the macro level, I suggest the following actions:

- Research gainsharing and reward systems thoroughly prior to any design work (my body of knowledge and reference list to facilitate the effort);
- Study my results chapter to get an idea of what outcomes may be expected as well as how the system may evolve;
- Study my conclusions to understand what worked and what did not in my study of CMI (not to say that the aspects would or would not have worked in another organization);
- Do not attempt to use gainsharing to "patch" inadequate management systems (e.g., using gainsharing to solve base compensation issues);
- Have an internal champion to lead the effort (in the CMI study the champion was the director); and
- Consider building the recommendations I made for CMI into the initial gainsharing system design.

Chapter 7 - Future Research and Lessons Learned

7.0 Future Research and Lessons Learned Overview

The purpose of the lessons learned and future research chapter is to provide future researchers with some of the lessons I learned while I conducted this study and to provide some ideas on future research studies.

7.1 Future Research

- 1) *Study the relationship between LOE and payout at the individual level.* My research looked at the LOE/Payout relationship at the organizational level and did not find one. I believe it would be useful to look at the relationship at the individual level. It may be possible that some individuals are affected and some aren't. The study could then focus on variables that moderate the affect of gainsharing payout on individuals.

- 2) *Study perceptions of gainsharing system impact based by MBTI score.* I believe studying whether the MBTI score moderates the perceptions of the gainsharing system or not would be valuable. Currently, research does not exist that has studied whether different personality styles are affected by gainsharing systems. For example, it may be the case that individuals who score high on the perceiving dimension would perceive that the gainsharing system does not provide adequate

information whereas individuals who score high on the judging dimension would perceive that the gainsharing system does provide adequate information. If it were to be determined that the MBTI score did moderate perceptions then it would allow the system designers to better tailor the reward system to meet the needs of the participant personality styles.

- 3) *Repeat my study for other organizations.* What makes my study less generalizable is that it was done on only one case site. Repeating this study on multiple sites would enhance the validity and generalizability of my findings.
- 4) *Repeat my study for CMI after five years.* This study contained very specific recommendations aimed at improving the gainsharing system. It would be worth studying to determine whether the implementation of those recommendations improved the performance of the system.

7.2 Lessons Learned from this Study

- 1) *Be "at-cause" for completing your research.* Your research is *your* research and not one else's. There were several times throughout the course of this project where I blamed others (e.g., advisor, classes, work, the study itself, spouse) for my problems instead of working to solve them. The result was lost energy and wasted time. Time spent complaining and blaming could have been better spent on solving and improving.
- 2) *Allow extra time for data analysis.* Once I planned out how much time I needed to do my data analysis, I should have tripled it. I did not realize how much time the

data had to "cook" in my head before I could understand and interpret it. The more "cook" time you have, the better off you are.

- 3) *Plan the study like a project.* In many ways, I found my thesis to be similar to managing a large project. Tools I found helpful was the flowchart, gantt chart, and work break down structure. Use of the plans helped me organize and structure my thoughts. I believe I spent less time on rework because I applied project planning principles. The difficulty lies in predicting the tasks without having knowledge of what the tasks look like. The advisor and other students can offer some help, but keep in mind that the research study is an act of creation and more of a perplexity than a project. Triple the time allocated to tasks to help compensate and take the project plans seriously.
- 4) *Know how many balls you can juggle.* Throughout my research I was only capable of juggling three out of four balls (research, work, classes, and personal). At any given point one of the balls fell down. It was very tempting to believe I was more capable than I actually was, but the reality caught up with me. A lesson I have learned is that it is better to anticipate a ball falling and plan accordingly than to wait for the ball to fall and then manage consequences.
- 5) *Portray the data to conclusions to recommendations chain.* I found it very useful to portray the data I collected, the conclusions I formed, and the recommendations I developed in an interrelationship digraph. It helped me better understand how all the pieces fit together.

6) *Solidly link conclusions to research questions.* I believe the research questions represent the knowledge to be gained from the study. In a sense, the conclusions are outputs from the answers. I found it useful to answer my research questions first, then develop my conclusions second.

Appendix A - Gainsharing System Desired Outcomes

Before evaluating CMI's gainsharing system to determine whether its desired outcomes were being met, it was necessary to determine CMI top management expectations of the system. I determined the desired outcomes as follows:

- 1) I questioned (via electronic mail) the CMI partners (who are the gainsharing system decision-makers) individually and determined their individual desired outcomes of the gainsharing system. The questions were: What do you expect to happen as a result of gainsharing? Why do you feel the CMI should gainshare?
- 2) I then shared the results of the first round of interviews with the CMI partners and questioned them individually again. The second question was: Given the collective responses from you and your peers in the first round, would you like to add to your initial response?

The collective responses are as follows:

Why do you feel the VQPC should gainshare?

- Because our income is so variable from quarter to quarter that we need to be able to cover our downside with less labor costs while not having to consistently resort to layoffs.
- Gainsharing should be an essential part of partners' equity system. Partners should share in profits to offset their reduced base salaries. This is the only way that the VQPC can be competitive and keep good quality people at the partner level. Without consistent 30% gainsharing partners will move on.

- Gainsharing is good for the rest of the center to give them information as to how we are doing and motivate them to act in such a way to make us do better as a center. But I think INFORMATION SHARING is the key at this level, money is secondary.
- In order to:
 - better manage the center's motivation sub-system (front)
 - adequately compensate revenue generators
 - supplement the state's flawed compensation system
 - strengthen the perceived relationships of (1) efforts leading to performance, and (2) performance leading to outcomes.
- Because if an organization "wins", achieves high performance levels and succeeds doing so, then the individuals who caused it deserve to share some of the gains.
- because consistent levels of performance above acceptable levels (APL), say at "motivated levels of performance" (MPL) or 130-200% above acceptable performance levels should be rewarded with variable compensation--balance between direct financial, indirect financial, and non-financial.
- We should "Experiment" with gainsharing because it is a timely, controversial aspect of creating and maintaining a high performing organization/team and it is part of the "roots" of industrial engineering. We do not yet know enough about gainsharing as a component of compensation management in the high performing organization of the 90's.

What do you expect to happen as a result of gainsharing?

- I expect individuals involved in gainsharing will experience improved quality of work life and exhibit increased productivity, profitability, effectiveness, and maybe efficiency. This will translate into increased performance on all dimensions mentioned above for the VQPC.

- I expect each individual will be more motivated to pursue and internalize methods by which to improve performance.
- Individuals will seek out ways to make the center more viable and will act on these.
- If gainsharing is consistent it will help moral, motivate productivity, and make us more customer-focused.
- If gainsharing is inconsistent it hurts moral, can be amotivating, makes people less system-thinking, and is confusing.
- I believe some will be more motivated by it, some less
- I believe some will feel it is deserved, they will expect it; others will feel over-justification; others will be delighted by it, pleased that they are receiving some of the gains of teamwork
- I believe it should help us sustain motivated performance levels (MPL)
- I believe it will continue to cause loyalty and dedication and willingness to go above and beyond the call of duty (APL)
- I believe it can be a source of "equity creation", but if we manage the formula wrong (as we are now doing) it can also be a source of inequity, dissatisfaction and lowering of performance.
- My concern is that it will cause us to always be willing to work harder and not necessarily spark us to work smarter. I think I have seen it "justify" overtime rather than improving methods and processes.

Appendix B - Gainsharing Evaluation Form

Center Gainsharing Evaluation Form

Please indicate which team (or teams) you are on:

SST _____ RDT _____ BDT _____ Partner _____

The following statements are about the center's gainsharing system. When responding to each statement, think about the center as a whole.

Please indicate your agreement with the following statements about the center's gainsharing system. Please use the following scale:

1	2	3	4	5
Strongly Disagree (Opposite is true)	Disagree	Neutral (No visibility/effect)	Agree	Strongly Agree (Statement is true)

Statement	Score
1) The gainsharing system allows the center to cover their downside by reducing labor costs without having to consistently resort to layoffs.	_____
2) The gainsharing system allows the center to be competitive.	_____
3) The gainsharing system allows the center to keep good quality people at the partner level.	_____
4) The gainsharing system is an essential part of the partners' equity system.	_____
5) The gainsharing system provides center personnel with information on how the center is doing/performing.	_____
6) The gainsharing system helps the center better manage the motivation sub-system.	_____
7) The gainsharing system supplements the state's compensation system.	_____
8) The gainsharing system helps people see the relationship between their effort and the center's performance	_____

1	2	3	4	5
Strongly Disagree (Opposite is true)	Disagree	Neutral (No visibility/effect)	Agree	Strongly Agree (Statement is true)

- | | |
|--|-------|
| 9) The gainsharing system helps people see the relationship between performance and outcomes (e.g., success or failure). | _____ |
| 10) The gainsharing system allows people to share in the success of the center. When the organization wins, the people win. | _____ |
| 11) The gainsharing system allows people to be rewarded with variable compensation for consistent performance above acceptable levels. | _____ |
| 12) The gainsharing system is an experiment. | _____ |
| 13) Employees experience improved quality of work life as a result of the gainsharing system. | _____ |
| 14) Personnel are more motivated to pursue/internalize methods by which to improve performance as a result of the gainsharing system. | _____ |
| 15) Personnel seek out ways to make the center more viable as a result of the gainsharing system. | _____ |
| 16) Personnel act out ways to make the center more viable as a result of the gainsharing system. | _____ |
| 17) The gainsharing system helps moral. | _____ |
| 18) Personnel are more productive as a result of the gainsharing system. | _____ |
| 19) Personnel try harder to keep the center profitable as a result of the gainsharing system. | _____ |
| 20) Personnel are more efficient as a result of the gainsharing system. | _____ |
| 21) Personnel are more effective as a result of the gainsharing system. | _____ |
| 22) The gainsharing system makes personnel more customer focused. | _____ |
| 23) Personnel feel gainsharing is deserved. | _____ |
| 24) Personnel expect gainsharing. | _____ |
| 25) Personnel are delighted by gainsharing. | _____ |
| 26) Personnel are pleased that they are receiving some of the gains of teamwork. | _____ |
| 27) The gainsharing system helps sustain motivated performance levels. | _____ |

1	2	3	4	5
Strongly Disagree (Opposite is true)	Disagree	Neutral (No visibility/effect)	Agree	Strongly Agree (Statement is true)

28) The gainsharing system helps cause loyalty to go above and beyond the call of duty.	_____
29) The gainsharing system helps cause dedication to go above and beyond the call of duty.	_____
30) The gainsharing system helps cause willingness to go above and beyond the call of duty.	_____
31) Personnel work harder as a result of the gainsharing system.	_____
32) Personnel work smarter as a result of the gainsharing system.	_____
33) The gainsharing system bonus is equitably distributed.	_____
34) Product quality is enhanced as a result of gainsharing.	_____
35) Personnel are more innovative as a result of gainsharing.	_____
36) Communication is enhanced as a result of gainsharing.	_____
37) Teamwork is enhanced as a result of gainsharing.	_____
38) The gainsharing system was originally developed using a credible development process.	_____
39) The gainsharing bonus calculation is understandable.	_____
40) Personnel control the gainsharing bonus amount.	_____
41) A quarterly gainsharing bonus is timely.	_____
42) The gainsharing system is well maintained.	_____
43) There are adequate opportunities to influence the gainsharing bonus.	_____
44) The gainsharing system helps improve employee retention.	_____

If applicable, what do you feel is wrong with the gainsharing system?

How do you feel the gainsharing system might be improved?

Appendix C - Detailed Description of Key Changes

1 Gainsharing Experiment Begins (7-8/87)

Description of Key Change:

The original gainsharing system was established the first quarter of fiscal year 1988. All graduate students and administrative staff were eligible. The bonus pool was determined by noting the change in the center cash accounts (or fund balances), subtracting out the profit goal for that quarter, and then sharing the rest with the employees. The distribution of the bonus pool was done equitably. Equitably means that the individual bonus were determined as a function of base pay. The individual's base pay as a percentage of total payroll was calculated. That percentage was the percentage of the bonus pool that the individual received.

Circumstances of Key Change:

The center had their first really large project. Personnel were being asked to engage in significant travel and a very high level of performance was required in order for the center to be effective. Also, the director wished to try gainsharing as he believed the center should practice what they preached and that gainsharing would be an important component of the organization of the future. It was also a way to keep salary costs low and still provide competitive compensation.

Perceived Impact of Key Change:

Gainsharing was welcomed. A good job was done informing people and keeping them informed. Most people were involved in the system. The system was treating all individuals the same and helped them feel connected to the center. Gainsharing was a very new thing at the time. It was not made clear to personnel that gainsharing would be continued past that one payout. A research interest in gainsharing emerged. Participants were skeptical at first. Most of their focus was on regaining what was perceived to have been lost. After the payout, participants felt good about gainsharing. They felt they had earned their bonuses.

2 Gainsharing Formula of 50/25/25 with 30% Ceiling Implemented (3-6/88)**Description of Key Change:**

In the fourth quarter of fiscal year 1988, a sharing ratio was established and a 30% of payroll bonus ceiling established. The sharing ratio stated that dollar amount to be shared with employees was determined by establishing the dollar surplus (change in fund balance minus the profit goal) then returning 50% back to the company, 25% for the employee "rainy day" account (future dollars to be shared with employees in the event of a business downturn), and 25% for immediate distribution to employees. The 30% ceiling stated that employees could not receive a bonus greater than 30% of their base pay.

Circumstances of Key Change:

This change was done after the formula determined the amount to be gainshared. The director felt the amount was too high in magnitude and too high a percentage of base

pay. The literature on many gainsharing plans suggested a 50/25/25 split and the literature on Improshare gainsharing plans suggested a 30% ceiling. The reserve pool was established to allow for the sharing of bonuses during a non-profitable quarter.

Perceived Impact of Key Change:

People were still happy with the payout. It was good to receive a bonus. Individuals felt that they deserved that payout. In many respects it was considered to be a windfall. Graduate students worked a lot of overtime and the gainsharing seemed to make it a little more worth it. Many graduate students felt that gainsharing gave them what they should have been paid to begin with. Employees were not really bothered by the change. They were happy with their total bonus. Since the sharing ratio and 30% ceiling were part of the gainsharing literature, they felt comfortable with the change. There wasn't any perceived adverse impact. Individuals seemed to agree with the decision.

3 Equal Pay Share Added to Distribution Formula (7-9/88)

Description of Key Change:

The equal pay share was added to the distribution formula on the first quarter of fiscal year 1989. Prior to the equal pay share being added, the distribution was determined as a function of base pay. The addition of the equal pay share made the individual bonuses a function of both base pay and being in the system during the gainsharing period. The equal share was the same for all individuals except those who became eligible for gainsharing during the middle of the period. Those individuals received prorated portions.

Circumstances of Key Change:

Implementing the equal pay share was an attempt to make the system more egalitarian and participative. It was very difficult to separate what the individual contributed from what the team contributed. To rely solely on an equitable share seemed unfair because then the graduate students received less as they were only part-time salaried through their graduate funding. Adding an equal share seemed to make the system more equitable.

Perceived Impact of Key Change:

This change had no real impact on the system. There may have been a minor improvement in the equitability of the system. As long as equal was less than the equitable share, no one was really against it. We probably would have been better off just leaving the system alone. There really isn't much of a difference between equal and equitable. We should have just picked one and stuck with it.

4 Director Right to Adjust Gainsharing Added to Distribution Formula (7-9/88)**Description of Key Change:**

The "director right" was added to the distribution formula in the first quarter of fiscal year 1989. The director right stated that the director had the right to remove individuals from the gainsharing system if they performed at less than an acceptable level of performance (APL).

Circumstances of Key Change:

The center was growing and moving beyond the span of control of the director. The director's philosophy at the time was that gainsharing decisions were consultative. This change was an attempt to use gainsharing as both a reward and punishment system. The director believed it was his prerogative to reward or punish individuals based on their performance. This was an attempt to control the variation in individual performance using the gainsharing system. Further, since the director was an industrial engineer, this was an attempt to combine the performance appraisal system with the gainsharing system to increase the performance management system efficiency. As the center did not have an effective performance appraisal system, the gainsharing system was used as a surrogate.

Perceived Impact of Key Change:

There was negative affect. This was the beginning of negative feelings about the gainsharing system as people were both disciplined and rewarded by the same system. This change was perceived as punitive and counter to the concept of team/organizational reward systems. Also, this use of the gainsharing system seemed inconsistent with the measurement system as the measurement system provided only organizational level performance information. Some individuals lost ownership for the system and started to perceive the system as the director's system.

5 Individual Peer Nomination Added to Distribution Formula (10-12/88)**Description of Key Change:**

The individual peer nomination was added to the distribution formula in the second quarter of fiscal year 1989. The individual peer nomination involved each gainsharing

participant anonymously rating all the other participants to determine how the individual share should be distributed. The purpose was to provide participants with feedback using a peer evaluation process and create a stronger link between pay and individual performance.

Circumstances of Key Change:

The organization was performing at a high level but not everyone was performing individually at that level. Some inequities were felt. The individual peer nomination was an attempt to provide a mechanism to address those inequities. We believed it was possible to link individual, group, and organizational rewards. This change was made to create an individual pay for performance component to the system.

Perceived Impact of Key Change:

This intervention did not work well. Personnel had difficulty rating each other. The pain associated with rating each other was perceived to be greater than the rewards we received. Most of the participants were novices at doing performance appraisals and peer evaluations. They found it very difficult to be objective. It was perceived that some individuals used the peer nomination to "grind an ax." Many individuals were passively against the system and gave all those that they rated the same amount. In essence, the individual share became almost the same as the equal share. It was also perceived that the director would readjust the individual shares. The director tended to raise the portion for those he had visibility for and lower it for others. The director tended to not recognize individuals working in the background. The system seemed to be based more on visibility with the director than performance.

6 Director Adjustment Column Added to Distribution Formula (7-12/91)

Description of Key Change:

The director adjustment column was added to the distribution formula in the first and second quarters of fiscal year 1992. (Note: first and second quarters were combined for gainsharing purposes.) The director adjustment column portrayed to the participants any adjustment in gainsharing amount that the director felt needed to be made for individual payouts.

Circumstances of Key Change:

The director had been adjusting the individual payouts. This just made the modifications more visible. This change was simply making something open, honest, and explicit what had already been there. This was more of a communication tool than anything else.

Perceived Impact of Key Change:

There was no positive or negative impact from this change. This change reinforced the belief that the director modified the gainsharing system's outputs. It served as a mechanism of portraying the director's opinion of individuals. Individuals would have preferred that the director not adjust the bonuses, but if the bonuses were to be adjusted then this was the mechanism by which to do it.

7 Self Managing Team Share Added to Distribution Formula (7-12/91)

Description of Key Change:

The self managing team share was added to the distribution formula in the first and second quarter of fiscal year 1992. The team share allocated an amount of the gainsharing pool to the self-managing teams to distribute as they choose.

Circumstances of Key Change:

This change was a reflection of an infrastructure change in the center. Self managing teams had been recently formed. An important component of self managing teams was team level recognition. Team members had greater visibility for the performance of their team members than anyone else. This change was an attempt to align the compensation system with the infrastructure system. It was felt that teams were different so their reward structure should differ to accommodate their diversity.

Perceived Impact of Key Change:

The effect of this change was that it reinforced the team concept in the center. It was considered to be a good idea. The team share worked as a mechanism for building the teams. However, there was a sense of inequity at the lack of an agreed upon method of distributing the team share.

8 Seniority Share Added to Distribution Formula (7-12/91)

Description of Key Change:

The seniority share was added to the distribution formula in the first and second quarter of fiscal year 1992. The seniority share allocated a portion of the gainsharing bonus pool to individuals as a function of their seniority. The total number of FTE (full time

equivalent) months of all participants were calculated and each participant received a portion of the seniority share based upon their percentage of the total number of FTEs.

Circumstances of Key Change:

This key change was initiated by a staff member as an attempt to reward individuals for demonstrated loyalty and commitment to the organization. More senior personnel tended to be at the lower end of the salary structure and were not receiving enough of the gainsharing pot. It was accepted by the director and senior leadership team and implemented.

Perceived Impact of Key Change:

This change was well received by the gainsharing participants. The affect was positive and the seniority share has since become an important component of the distribution formula.

9 Year to Date Perspective Added to Gainsharing Formula (1-3/92)

Description of Key Change:

The year to date perspective was added to the gainsharing formula in the third quarter of fiscal year 1992. Prior to this change, the gainsharing formula looked at the changes in fund balance on a quarter by quarter basis. The year to date perspective looked at the quarter *and* the projections for the rest of the fiscal year.

Circumstances of Key Change:

The senior leadership team was worried that they had paid out in quarters and lost for the year. If they paid out a lot of dollars in the first two quarters then they might take a

large loss for the third and fourth quarters to result in a loss for the year. This was done to better "play it safe" and not over-share gainsharing amounts. The formula was not really trusted. There were concerns of the accuracy of the data being provided and the budgets were not very good. The year to date perspective allowed the leadership team to build greater stability into the system. Also, this change helped ensure the profitability of the fiscal year instead of just the quarter.

Perceived Impact of Key Change:

There was no real affect perceived. Personnel were glad that something was being shared even though the center was not truly following the formula. This change kept the center from having as many financial setbacks. It made the system less demotivating and more consistent. It seemed to build in greater stability.

10 Revenue Generator Share Added to Distribution Formula (7-9/92)

Description of Key Change:

The revenue generator share was added to the distribution formula the first quarter of fiscal year 1993. Those individuals classified as revenue generators (research associates and scientists) were allocated a portion of the gainsharing bonus pool based upon their completion of their revenue generator goals.

Circumstances of Key Change:

There existed a need to emphasize the notion that there are some individuals who are critical to the center. The center had recently lost a large grant. It was recognized that without a grant, the center needed certain people bringing in new business. The revenue generator share was a way to reward those individuals. This seemed to be the

only way to recognize outstanding revenue generator performance. There were also some base pay issues at the time and this was an attempt to fix base pay problems with gainsharing.

Perceived Impact of Key Change:

Some folks were initially uncomfortable with the revenue generator share. This was a new system and some folks weren't used to it. At the time, many participants were more concerned with the possibility of layoffs and were not too concerned with the gainsharing system. Revenue generators were satisfied. Some felt the change to be motivating while others didn't. Overall, the perceived impact was positive as it rewarded a dimension of performance that was critical to the center's survival. The research associate/scientist goals that were derived were perceived to be exhortations.

11 Revenue Generator Distribution Column Added to Distribution

Formula (10-12/92)

Description of Key Change:

The revenue generator distribution column was added to the distribution formula in the second quarter of fiscal year 1993. The revenue generators were given an amount of money to distribute to those individuals they believed deserved rewards.

Circumstances of Key Change:

The revenue generators wanted a portion of the gainsharing pool to reward those individuals who had contributed to the revenue generator's success. It was done to strengthen the internal customer-supplier linkages.

Perceived Impact of Key Change:

The perceived impact was mixed. Some participants perceived the gainsharing system to be more equitable. In some it created some negative feelings and affect. Some felt the magnitude of dollars was never enough to motivate and that the revenue generator distribution portion of the system created dysfunctional dynamics over trivial sums of money. It seemed totally subjective.

12 Gainsharing Shared as a Motivator (1-3/93)**Description of Key Change:**

Gainsharing was shared as a motivator the third quarter of fiscal year 1993. Even though the organization lost money that quarter, gainsharing took place.

Circumstances of Key Change:

This may have been an accounting mistake. Gainsharing may have taken place as a result of incorrect financial information. In any event, the center morale was in pretty bad shape. Personnel had worked very hard to get out of the "loss of a major grant" slump. Gainsharing may have been done as a "shot in the arm." People had worked very hard and deserved a little extra compensation. There was a lot of new work coming and the senior leadership team had faith in the future. It was also done to maintain the visibility of the gainsharing system.

Perceived Impact of Key Change:

There was some negative affect as we had laid some folks off that quarter. Some folks wondered how we could gainshare and lay people off at the same time. There may have been a small morale improvement.

13 Accounts Receivables Used in Gainsharing Formula (7-9/93)

Description of Key Change:

The dollars in accounts receivables were added to the cash accounts in the first quarter of fiscal year 1994. Accounts receivables were dollars that had been billed to clients but the money was not yet in the fund balances. The gainsharing formula then became: change in cash accounts (including the dollars in accounts receivables) minus the profit goal equals the dollar surplus for the quarter.

Circumstances of Key Change:

Accounts receivables were for work already completed but payment had not yet been received. There was a large time lag between the work and the payment. Using accounts receivables served to narrow the gap. We were working very hard without gainsharing. Many of the revenue generators were pushing to gainshare even if the numbers did not justify it. They felt that the center was much better off than the gainsharing system showed.

Perceived Impact of Key Change:

In the first quarter it was used it significantly increased the fund balance. It was an artificial inflation though. It was not a good use of data. Using accounts receivables in the formula was too liberal. One should have the money in hand before sharing it.

14. Distribution Determined Subjectively (1-3/94)

Description of Key Change:

In the third quarter of fiscal year 1994, the distribution of gainsharing was not done using the traditional distribution formulas. The senior leadership team subjectively distributed bonuses based upon the individual's position in the organization and relative contribution to the organization.

Circumstances of Key Change:

There was low trust in the accounting system and revenue generators felt they should have received more gainsharing as a commission. Revenue generators had major projects and did most of the travel. They felt undercompensated and had a high intent to turnover. Gainsharing was being manipulated in the context of a partnership and to make being a revenue generator more attractive. Gainsharing was done in this manner to keep key people from exiting the system. Gainsharing was done to appease the revenue generators.

Perceived Impact of Key Change:

This change did not seem like a major change. The gainsharing seemed really subjective anyway. From a stability standpoint, this change reduced the stability of the center's chosen method of implementation. It showed how flexible the gainsharing system was. Revenue generators saw an improvement as it made the compensation of the revenue generators more realistic. The research scientists felt motivated by gainsharing. Some of the other members of the center may have felt a little demotivated if they felt anything at all. Most seemed to be pleased just to be gainsharing. The effect on the overall gainsharing system was that gainsharing started to get an overhaul. It needed to be redesigned to reflect the changes that were occurring in the center.

Revenue generators needed to be separated from the rest of the center as they were different.

15 Gainsharing Bonus Pool Determined Subjectively (4-6/94)

Description of Key Change:

In the fourth quarter of fiscal year 1994, the calculation of the bonus pool amount was determined subjectively. The traditional gainsharing ratios (change in fund balance minus profit goal then 50/25/25) were not used.

Circumstances of Key Change:

There was a concern about a net loss for the quarter. The sharing ratio did not seem to provide appropriate information given that the center had had a good fiscal year and seemed well-postured for the next fiscal year. The accounting system was still not really trusted. The center was being affected by the use of accounts receivables as it gave a false impression of the amount of money the center had. The intention of this change was to consider it an "advance" of the next fiscal year's gainsharing.

Participants believed that they all deserved some reward. They also wanted to ensure that the graduate students received some gainsharing the last quarter that they were eligible.

Perceived Impact of Key Change:

From an overall perspective, the change violated the integrity of the gainsharing system. This change was not viewed as negative. It started us to question the validity of our previous gainsharing formulas and forced the center to engage in a redesign of the gainsharing system. It also gave revenue generators more direct control over the

amount of dollars to be distributed. From a personal point of view, it was motivating to receive monetary compensation. It positively affected motivation for research associates and research scientists. Not sure about the graduate students and support personnel.

16 Part-Timers Removed from Gainsharing System (7-9/94)

Description of Key Change:

Part-time personnel (non-salaried administrative personnel) were removed from the gainsharing system and given lump sum bonuses instead the first quarter of fiscal year 1995.

Circumstances of Key Change:

The need existed to stabilize gainsharing for full time employees. It was believed that it was hard to see the linkage to organizational performance given the nature of part-time work. Also, since many of the part time personnel had been in the system just as long as some of the full time personnel, it seemed inequitable that they receive roughly the same seniority share as well as the same equal share. Part-timers seemed different enough from the full-time personnel that the formulas did not seem to apply. The choice was to either use a different formula for part-timers or to use a bonus system. The bonus seemed like the appropriate mechanism.

Perceived Impact of Key Change:

The impact of this change on the system was that the bonus pool for the full time salaried personnel was increased. The system was finally able to provide close to 30% of base pay for the full time personnel. It added integrity to the gainsharing system.

Part-timers are different and their difference should be recognized in how the center does gainsharing. It was not clear what the effect of this change was on part-timer motivation.

17 Graduate Students Removed from Gainsharing System (7-9/94)

Description of Key Change:

Graduate students were removed from the gainsharing system and given tuition waivers (valued at roughly \$4,095/year) instead the first quarter of fiscal year 1995.

Circumstances of Key Change:

Graduate students were required to receive tuition waivers by the larger system. The senior leadership looked at how that could be accomplished and the budgetary impact. Allowing graduate students to receive tuition waivers and remain on gainsharing would have had too great a negative impact on the budget. Also, it seemed inequitable for the graduate students to receive both tuition waivers as well as gainsharing since the value of a tuition waiver was much greater than what graduate students could make through gainsharing.

Perceived Impact of Key Change:

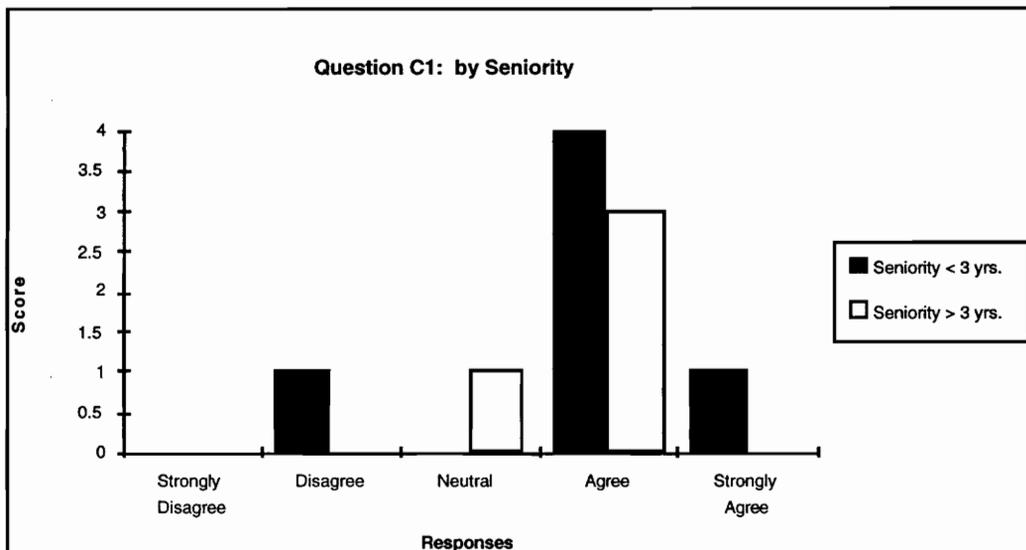
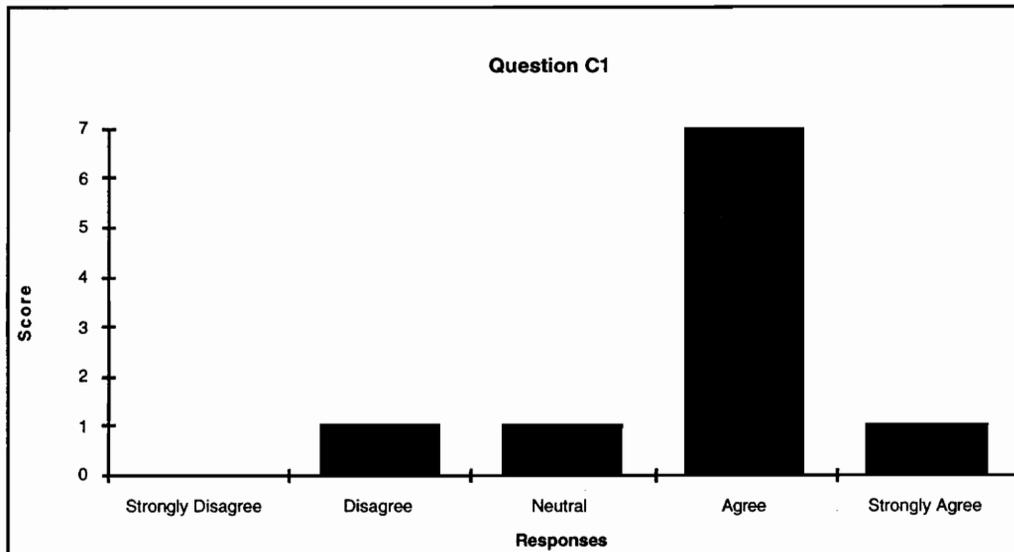
Students were no longer part of the system. Some students may have been in a state of confusion over the change. Students seemed to understand the reason for the change and were not affected too severely. Besides, it was perceived that the tuition waiver was of comparable if not greater value.

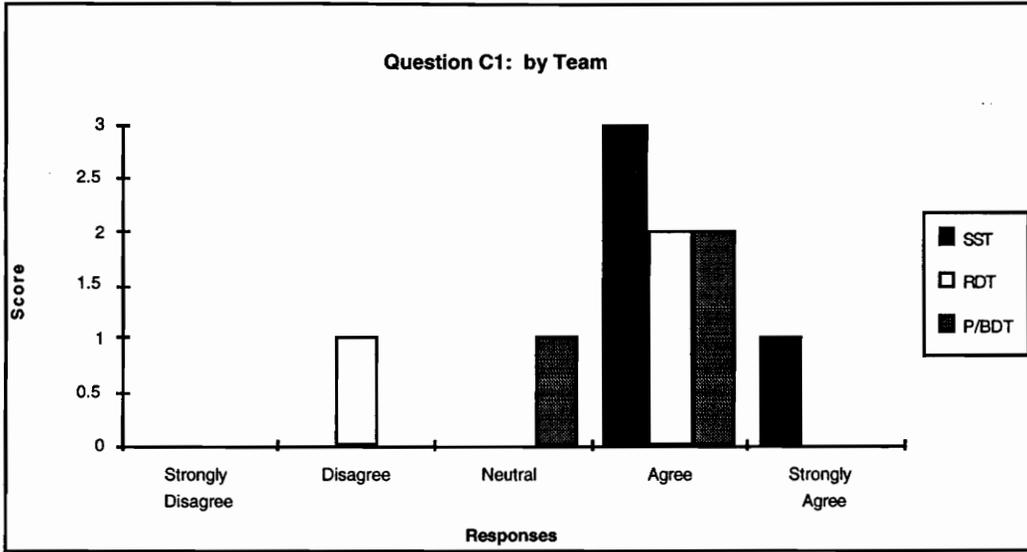
Appendix D - Histograms on Current Participants' Perceptions of the Gainsharing System

This appendix portrays histograms showing the between group variation in current participants' perceptions of the gainsharing system. The questionnaire (presented in Appendix B) used to assess their perceptions contained 44 questions. Each of the sets of responses to the 44 questions were portrayed on histograms and analyzed by team, seniority, and overall. Initially, all 132 histograms were portrayed in this appendix. However, given that only four of the question response sets contained significant variation between groups, only the histograms associated with the four question response sets have been presented. The following are the histograms associated with the four question response sets.

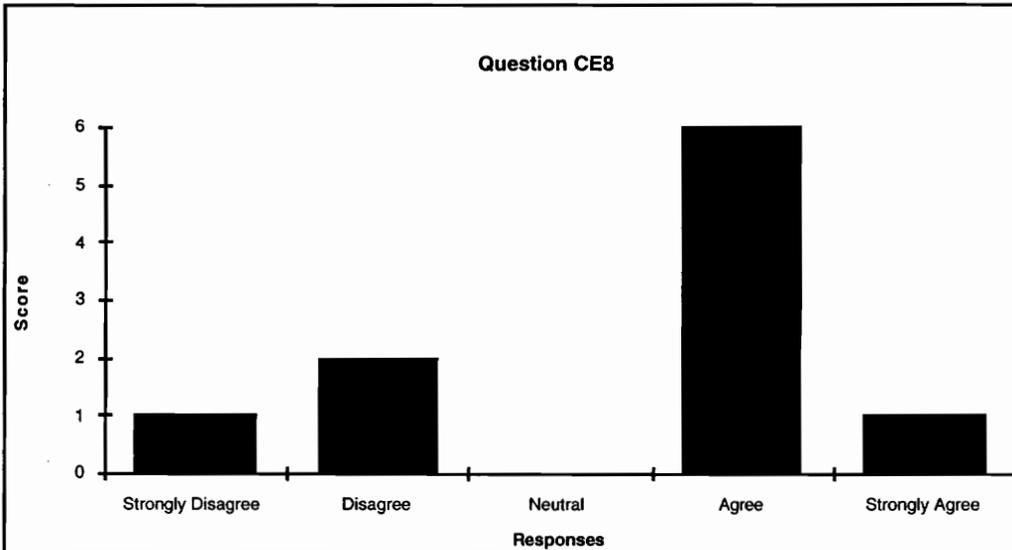
C Perceptions on Gainsharing Fostering Commitment

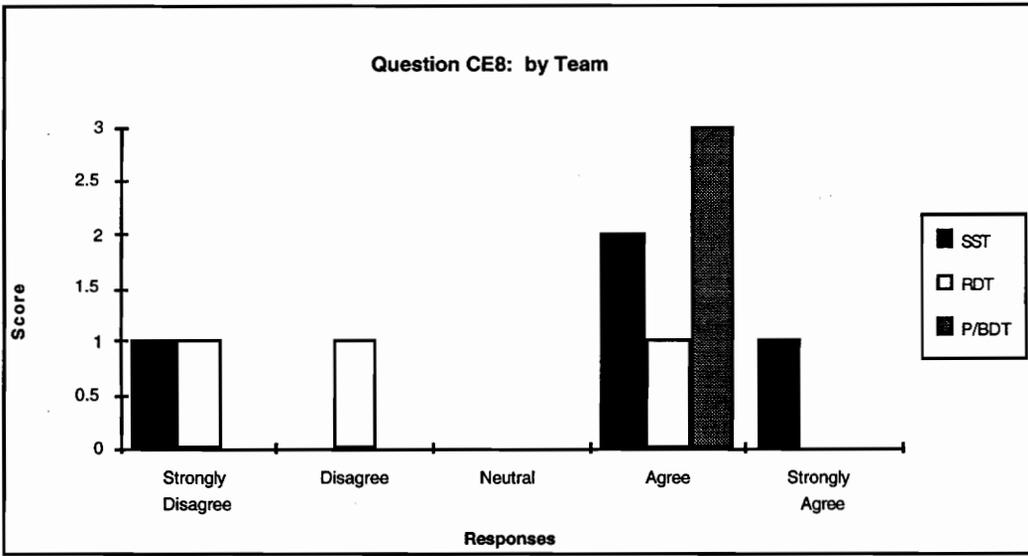
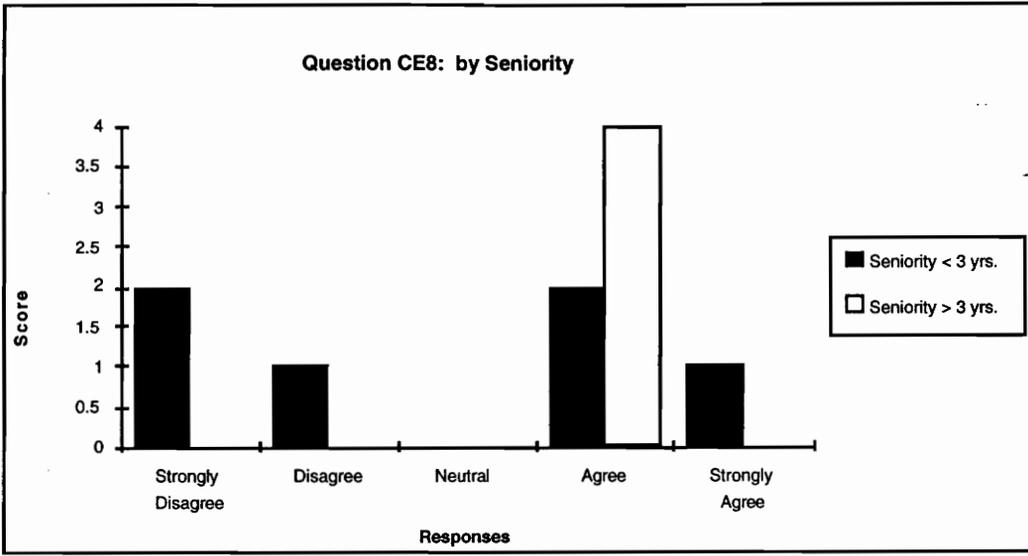
C1) The gainsharing system allows the center to keep good quality people at the partner level.				
Mean	Median	Mode	Std. Dev.	Range
3.8	4	4	0.79	3





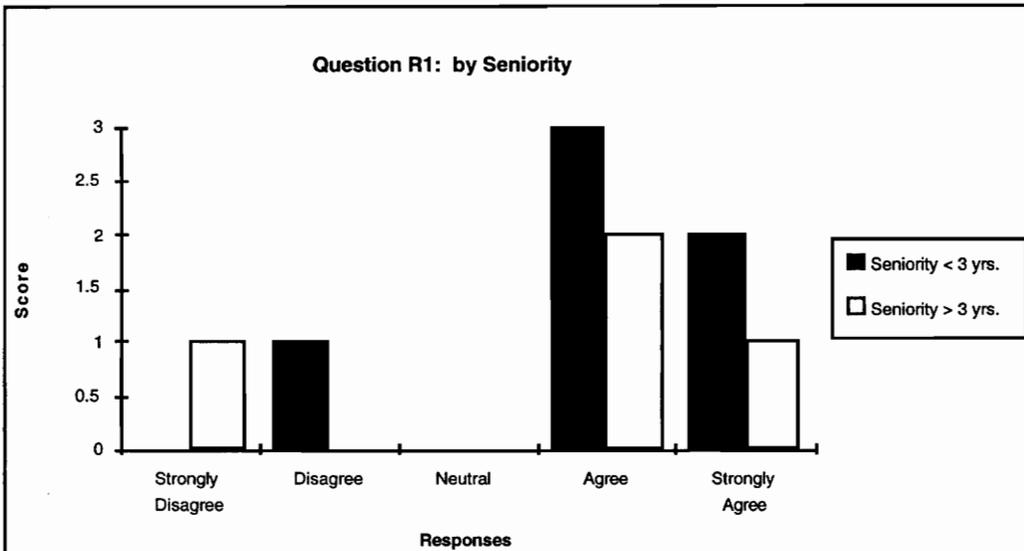
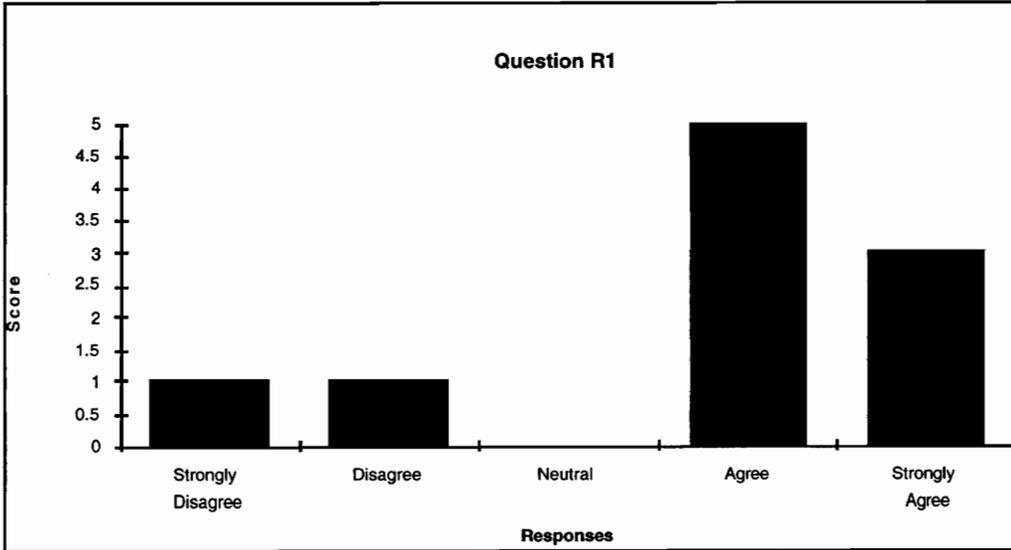
CE8) The gainsharing bonus calculation is understandable.				
Mean	Median	Mode	Std. Dev.	Range
3.3	4	4	1.42	4

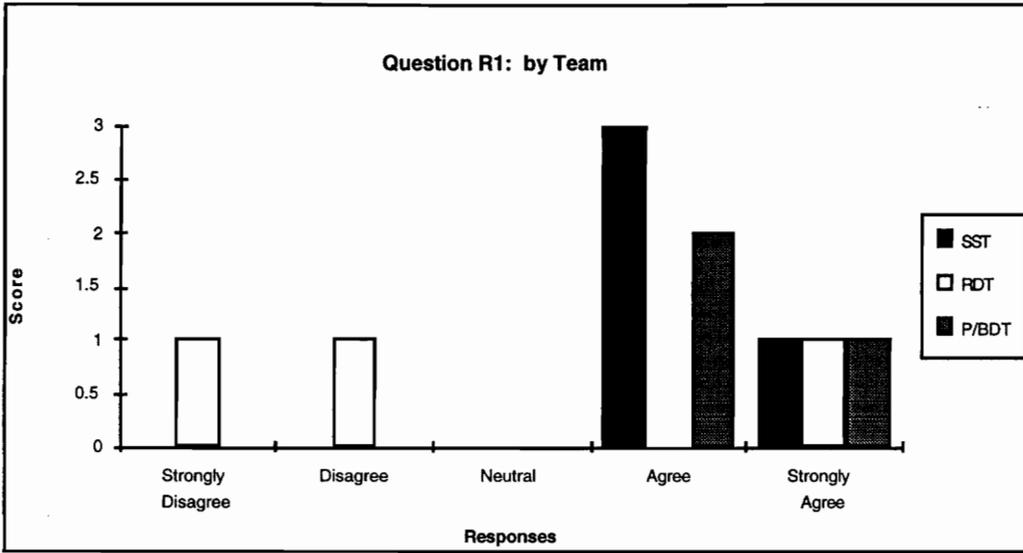




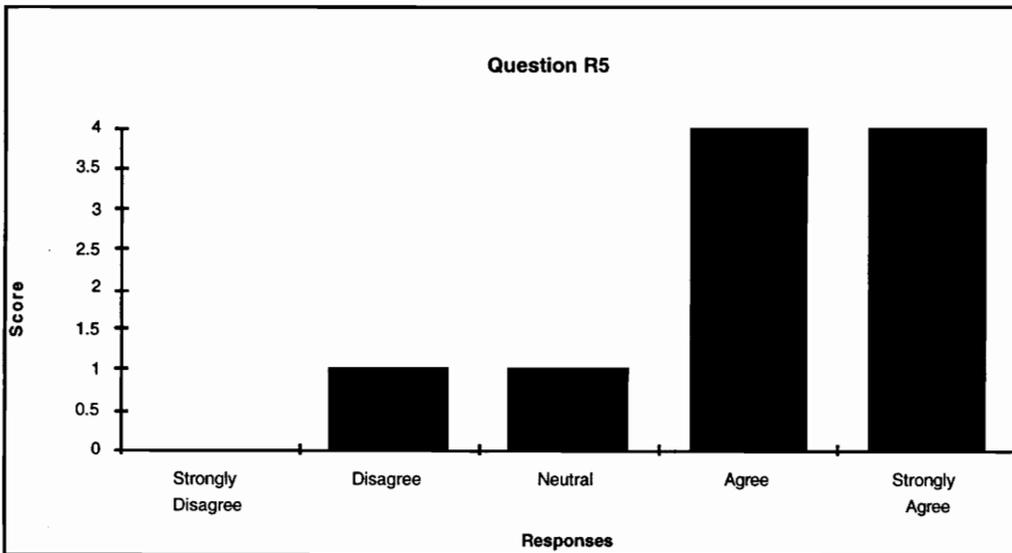
R Perceptions of Gainsharing System Rewards

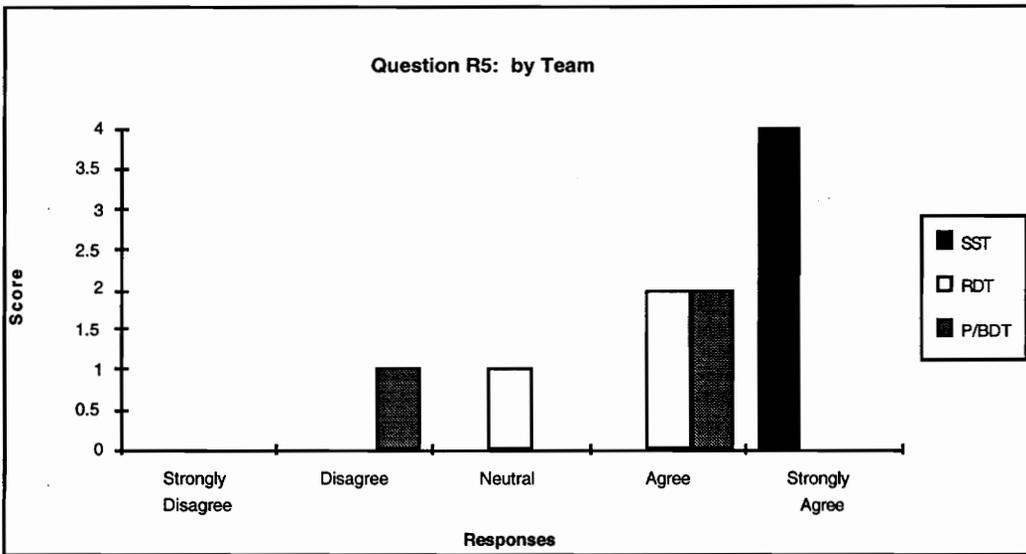
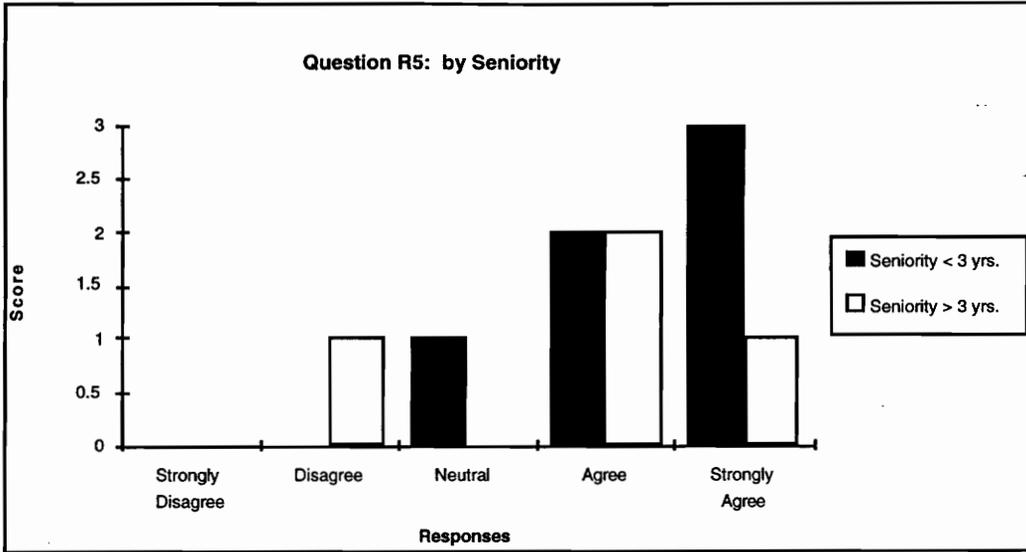
R1) The gainsharing system is an essential part of the partner's equity system.				
Mean	Median	Mode	Std. Dev.	Range
3.8	4	4	1.32	4





R5) Personnel are delighted by gainsharing.				
Mean	Median	Mode	Std. Dev.	Range
4.1	4	4	0.99	3





Appendix E - What is Research?

E.1 Research and the Research Process

The following section describes research and the research process. The definition of research, the Wallace (1971) Research Wheel, and dimensions of research are discussed. The purpose of this section is to provide a brief overview of research and the research process and how this research study fits in.

E.1.1 A Definition of Research

What is research? Emory and Cooper (1991) define research as "a systematic inquiry aimed at providing information to solve problems." Webster (1991) defines research as "the careful, systematic, patient study and investigation in some field of knowledge, undertaken to discover or establish facts or principles." My operational definition of research is that it is a cyclic process of creating new knowledge and/or confirming "established" knowledge.

Wallace (1971) states that there exist four ways of generating and testing knowledge: authoritarian, mystical, logico-rational, and scientific. The distinction between these is the manner in which each vests confidence in the producer (who says so?), procedure (how do you know?), and the effect (what difference does it make?). The authoritarian mode generates and tests knowledge primarily by referring to those who are socially defined as qualified producers of knowledge (e.g., kings, professors, presidents). The mystical

mode generates and tests knowledge based upon the procedures that are employed (e.g., ritualistic purification, sensitizing procedures) and by referring to the producer (e.g., god, spirit world). The logico-rational mode generates and tests knowledge based solely upon the procedure of producing the knowledge. The procedure centers on the rules of formal logic. Finally the scientific mode generates and tests knowledge based upon the observable effects and the reliability of the procedures used to obtain the effects. The goal in the scientific mode is to minimize the role of the producer. Our confidence as recipients varies depending on the mode or modes employed. A typical research study may consist of multiple modes (e.g., the citation of authoritative figures, the use of formal logic to deduce hypotheses, the use of scientific research methodologies).

E.1.2 Research as a Process

Leedy (1993) states that research is not a haphazard activity, it follows a standard procedure in a logical sequence. That standard procedure has eight distinct characteristics:

- 1) Research begins in the mind of the researcher.
- 2) Research demands that the researcher articulate a specific goal for the investigative process. This is known as the statement of the problem.
- 3) Research demands a specific plan of procedure. This is known as the research method.
- 4) Research generally recognizes that a frontal attack on the entire problem is too much to attempt at one time. Every problem must be divided into subproblems.
- 5) Research is generally guided by constructs called hypotheses.
- 6) Research accepts certain critical assumptions.
- 7) Research countenances only specific, measurable data.
- 8) Research is, by nature, a circular or helical process.

To restate Leedy, research is first conceived in the mind of the researcher due to recognition of a problem situation. It is then articulated as a specific goal called the problem statement. The problem is broken down into manageable subproblems. A research plan or methodology is determined that will meet the goals and subgoals. Hypotheses of the problem are formulated and limiting assumptions recognized. Specific, measurable data is gathered, analyzed, and interpreted (as stated in the research methodology) to form conclusions. The research process then begins anew.

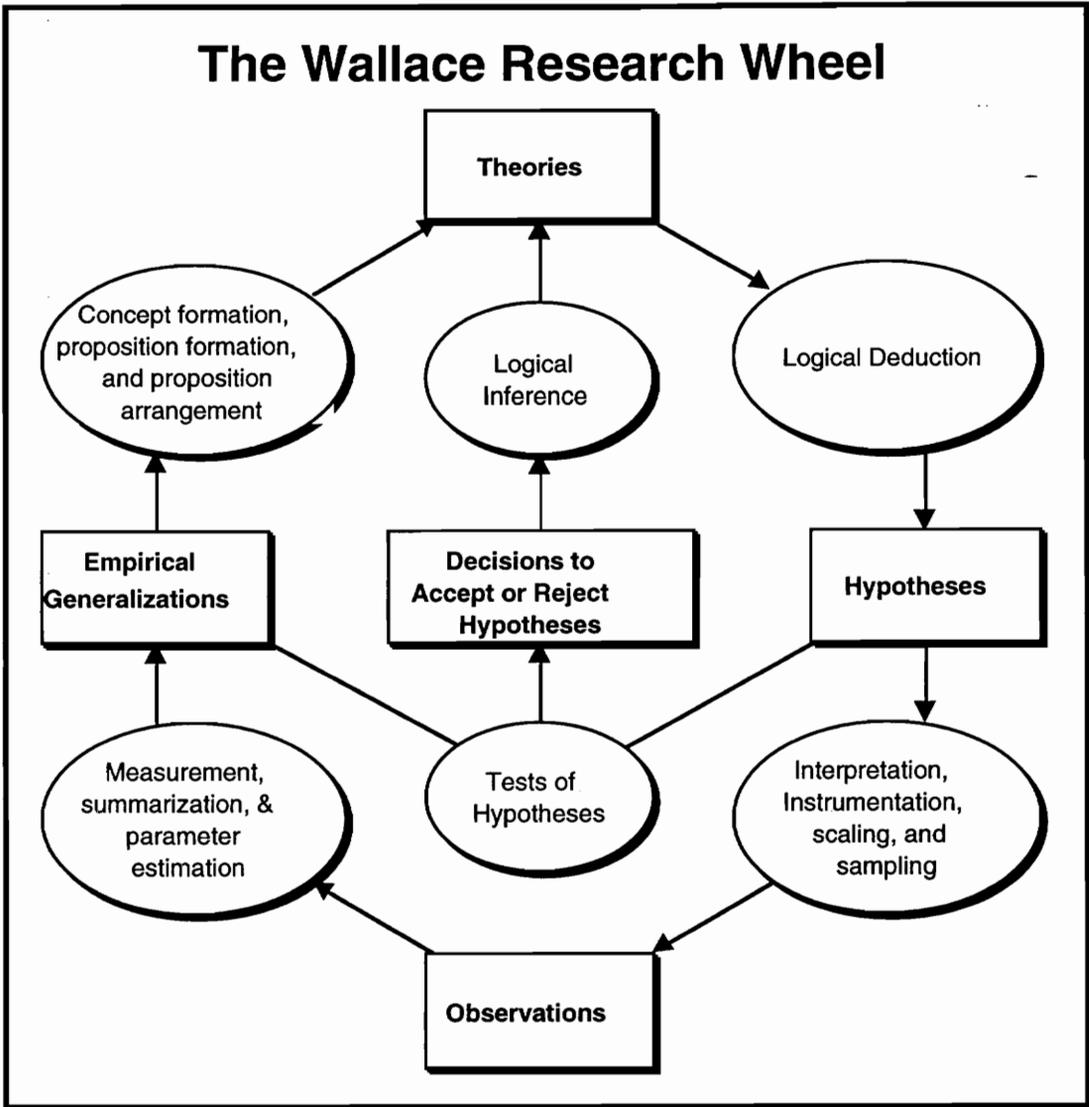
Wallace (1971) also portrays the scientific process (research) as a cyclical process. He states that "the scientific process may be described as involving five principal information components whose transformations into one another are controlled by six principal sets of methods." Definitions of the components are stated in table E-1. How the components of the research process work together are portrayed in figure E-1.

Table E-1: Components of the Wallace Research Wheel

Component	Definition
Observations	Highly specific and essentially unique items of information whose synthesis into the more general form denoted by empirical generalizations is accomplished by measurement, sample summarization, and parameter estimation.
Empirical Generalizations	Items of information that can be synthesized into a theory via concept formation, proposition formation, and proposition arrangement.
Theory	A theory is the most general type of information. It is transformable into new hypotheses through the method of logical deduction.
Empirical Hypotheses	An information item that becomes transformed into new observations via interpretation of the hypothesis into observables, instrumentation, scaling, and sampling.
Hypothesis Testing	The testing of a given hypothesis to determine whether it conforms to either the empirical generalization or empirical hypotheses. Such tests may result in a new informational outcome: namely a decision to accept or reject the truth of the tested hypothesis which infers the confirmation, modification, or rejection of the theory.

(taken from Wallace, 1971)

The Wallace Research Wheel shows that research is both inductive as well as deductive, "theorizing" as well as "doing". The right side of the wheel describes deductive research (the application of theory) as the movement from theories to specific observations. The left side of the wheel describes inductive research (the construction of theory) as the movement from specific observations to theories. The top half of the wheel represents "theorizing" and the use of inductive and deductive logic methods through the movement from empirical generalizations to empirical hypotheses. The bottom half of the wheel represents the "doing" of empirical research, with the assistance of research methods, through the movement from empirical hypotheses to empirical generalizations.



(Figure E-1; Taken from Wallace, 1971)

Using Wallace's model, my research study could best be described as both deductive as well as inductive. It is deductive as I am formulating hypotheses to test and evaluate the gainsharing system. It is inductive as I am reviewing specific observations from the history of the system and attempting to extract meaning from them.

E.1.3 Dimensions/Categories of Research

Research may be classified along a number of dimensions. The two dimensions I choose to discuss are *purpose* (Patton, 1990) and *method* (Leedy, 1993). The purpose, intent, or aim of the research study may be thought of as being on a continuum with basic research on one end and action research on the other (see table E-2). The difference being the generalizability of the research. The research method employed depends on the data. Verbal data (interviews, observations) require qualitative research methods (e.g., historical, descriptive). Numerical data (scaled surveys, financial data, quantitative measurements) require quantitative research methods (e.g., quantitative, experimental).

"With clarity about purpose, it is possible to begin considering specific design alternatives and strategies. Clarity about purpose helps in making decisions about critical trade-offs in evaluation research designs" (Patton, 1990). The purpose of my research study is to improve CMI's gainsharing system. Thus the type of research I am employing, based upon Patton's Typology, is formative evaluation. The formative evaluation seeks to improve an intervention: a program, policy, organization, or product. "Formative evaluation is limited entirely to a focus on a specific context. Formative evaluations aim at 'forming' the thing being studied. There is no attempt in formative evaluation to generalize findings beyond the setting in which one is working. The purpose of the research is to improve effectiveness within that setting. Formative evaluations rely heavily on process studies, implementation evaluations, case studies and evaluability assessments. Formative evaluations often rely heavily, even primarily, on qualitative methods" (Patton, 1990).

E-2: A Typology of Research Purposes

<i>Types of Research</i>	<i>Purpose</i>	<i>Focus of Research</i>	<i>Desired Results</i>	<i>Desired Level of Generalization</i>	<i>Key Assumptions</i>
Basic Research	Knowledge as an end in itself; discover truth.	Questions deemed important by one's discipline or personal intellectual interest.	Contribution to theory.	Across time and space (ideal).	The world is patterned; those patterns are knowable and explainable.
Applied Research	Understand the nature and sources of human and societal problems.	Questions deemed important by society.	Contributions to theories used to formulate problem-solving programs and interventions.	Within as general a time and space as possible, but clearly limited application context.	Human and societal problems can be understood and solved with knowledge.
Summative Evaluation	Determine effectiveness of human interventions and actions (programs, policies, personnel, products).	Goals of the intervention.	Judgments and generalizations about effective types of interventions and the conditions under which those efforts are effective.	All interventions with similar goals.	What works one place under specified conditions should work elsewhere.
Formative Evaluation	Improving an intervention: a program, policy, organization, or product.	Strengths and weaknesses of the specific program, policy, product, or personnel being studied.	Recommendations for improvements.	Limited to specific setting studied.	People can and will use information to improve what they're doing.
Action Research	Solve problems in a program, organization, or community.	Organization and community problems.	Immediate action; solving problems as quickly as possible.	Here and now.	People in a setting can solve problems by studying themselves.

(taken from Patton, 1990)

Leedy (1993) discusses four basic research methods: descriptive, historical, quantitative, and experimental (see table E-3). Using Leedy's taxonomy, the research methods I am primarily employing are descriptive and historical. "The nature of the data dictates the methodology. If the data is verbal, the methodology is qualitative. If the data is numerical, the methodology is quantitative" (Leedy, 1993). As my data is primarily verbal (e.g., interviews, historical documentation), both of the methods that I have chosen are qualitative research methods.

E-3: Leedy's Taxonomy of Research Methods

<i>Method</i>	<i>Characteristics of the Method</i>
Descriptive Survey	The descriptive survey looks with intense accuracy at the phenomena of the moment and then describes precisely what the researcher sees. It is employed to process the data that come to the researcher through observation.
Historical Study	The historical study deals with the meaning of events. It deals with the accumulation and interpretation of historical data.
Quantitative Study	The quantitative study converts the phenomena under study into numerals that may be interpreted and manipulated using statistical procedures. The quantitative study involves the accumulation, manipulation, and interpretation of numerical data.
Experimental Study	The experimental study is an attempt to account for the influence of a factor(s) conditioning a given situation. It attempts to control the entire research situation, except for certain input variables that can then become suspect as the cause of whatever change has taken place within the investigative design.

(taken from Leedy, 1993)

My research is historical as I am reviewing the history of the CMI's gainsharing system and trying to extract meaning from the events. "Mere happenstance is inimical to the facts

of history. Looking behind a random chain of events, historical research describes an underlying matrix of logical cause and effect. And the historical researcher attempts to establish, through the scientific method, a rational explanation for the cause of events and, based upon historical data, a logical interpretation of the effect that such events have upon the lives of individuals and the society in which they live" (Leedy, 1993). CMI's gainsharing system has evolved considerably since its conception in 1987. Through my research study, I will gather the relevant information on the history of CMI's gainsharing system, summarize and portray it, then interpret it to extract meaning from the events. My intent is not to explain what events occurred, but to present a factually supported rationale to explain why events occurred.

My research is also descriptive as I am qualitatively evaluating and describing the gainsharing system in the present. "To behold is to look beyond the fact; to observe, to go beyond the observation. Look at a world of men and women, and you are overwhelmed by what you see. Select from that mass of humanity a well-chosen few, and these observe with insight, and they will tell you more than all the multitudes together. This is the way we must learn: by sampling judiciously, by looking intently with the inward eye. Then, from these few that you behold, tell us what you see to be the truth. This is the descriptive-normative-survey method" (Leedy, 1993). My research is descriptive so I will take a snapshot of the present to assess whether or not CMI's gainsharing system is meeting its desired outcomes. I will look intensely at CMI's gainsharing system, using a structured interview, and describe what I see.

Appendix F - Compensation Management, Motivation, and the Grand Strategy System

F.1 The Grand Strategy System

CMI's gainsharing system is not an isolated intervention. It is a component of a large-scale, integrated effort to improve the overall performance of CMI. The framework that CMI is employing to operationalize their method of improving their performance is the Grand Strategy System (GSS). The GSS is a planning system that focuses the organization's resources into "fronts" or organizational sub-systems. The following description of the GSS is taken directly from By What Method? (Sink & Poirier, 1994).

A Grand Strategy System contains four basic components: (1) Past, (2) Present, (3) Future, and (4) Fronts. We [Sink & Poirier] assume and believe that continuity of leadership, constancy of purpose and consistency of method(s) are critical to the long term success of an improvement effort. Having said this, we believe that an understanding, awareness, analysis of the past and present are foundational to the construction of a GSS. So, one of the first steps in the construction of a GSS is to reflect on, dialogue about, analyze efforts to improve performance in the past and present:

Past

- what has worked and why?
- what hasn't worked and why?

- how have we performed over time? (statistical thinking, understanding variation, total performance assessment).
 - Critical Incidence analysis for past.
 - major milestone review.
 - false starts and why.
 - assess continuity of leadership, constancy of purpose, consistency of methods.
-
- what methods, tools, techniques, programs have been adopted? which have become ways of doing business? why? which have succumbed to entropy? why?

Present

- Mission/purpose of the target organizational system.
- Zero-base, blank sheet of paper analysis, if we could start over, what businesses/products/services would we engage in? What would our size be (people)? What would our mix be (people)? How would we be structured to succeed?
- Input/output analysis to provide appreciation of the system.
- Assessment of organizational capabilities, core competencies, how fast we can support and cope with change/improvement.
- Guiding principles, shared values along with a culture gap analysis. Are we walking the talk?
- Internal and external strategic analysis leading to the creation of assumptions.
- Current performance levels (introduce statistical thinking through the use of longitudinal or time series data).

- Assessment of the infrastructure supporting improvement.
- Evaluation of the skills of the organization in measuring, converting data to information, information to knowledge, and knowledge to decisions and actions; experience with the PDSA (plan, do, study, act improvement cycle). –
- Key leadership should complete a conceptual image document and professional plan of development.

These are but examples of the kind of analysis of past and present that need to be completed with a wide spectrum, perhaps the entire spectrum, of leadership and management in your organization.

Future

The future component compels us to address vision, plans, strategies, tactics:

- What is our vision in terms of mission, businesses we will be in, customers/markets served, technologies employed, levels of performance, values (e.g., business investments, operational procedures, organization characteristics, service to clients, customers, employees)?
- What overall strategies do we have for achieving our vision, our great performances, our plans?
- What would a great performance be for us in 12-18 months?
- What will we start doing that we are not presently doing to continue to improve our performance on the basis of our improved understanding of the past and present?

- What will we stop doing that we are currently doing because it hasn't worked, it won't work, we can't make it work, or it's not adding value?
- What will we continue to do because we need to stay the course, it will work, we haven't given it time enough to know whether it will or will not work, or it's the right thing to do?

These are but examples of the kind of thinking that must take place for the future component of grand strategy. This is all pretty straightforward to this point, nothing different than traditional strategic planning to this point. Now we introduce the concept of fronts, which will alter future planning significantly.

The fronts we have identified are:

- Planning--the planning system, includes strategic, performance improvement, business, marketing, operations planning, daily planning--the whole spectrum of planning, and most importantly includes the entire planning cycle, in other words, includes implementation and evaluation (e.g. PDSA)
- Infrastructure--how the organization is structured to do its business reflected in the organizational chart, position descriptions, functional and perhaps cross-functional responsibilities, but also, more importantly, how the organization is structured/organized to improve performance. Many organizations today are establishing "shadow organizations", collateral structure, alternate structures to improve performance and address cross-functional issues and problems.
- Education, Training and Development--the system by which all individuals in the organization are improving personally and professionally. Extends far beyond the

traditional domain of training departments, concentrates on an understanding of system-wide knowledge and skills for doing the job and for improving performance. The system of sharing knowledge and skills.

- Culture--the culture management system, how leaders and managers consciously attempt to ensure that “the pattern of basic assumptions-invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration-that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems” is supportive of continuous improvement (Schein, 1985).
- Motivation--the system of inducements, recognition, rewards that are created by the organization to ensure that willingness to cooperate is maintained and to ensure that everyone is doing their very best in a system that ensures that this will mean organizational success.
- Communication--the system of sharing information such that coordination, understanding, cooperation exists. This system is often not managed in a systematic fashion in most organizations.
- Measurement-- the system for sharing information regarding multiple levels of performance (individual, group, organizational), systematic identification of information requirements to support problem-solving aimed at performance improvement, creation of visibility, motivation for continued improvement.
- Technology--the system for managing “how we accomplish things.” Technology is

broadly defined as a way of getting something done. So, this front includes methods, procedures, protocol, hardware and software, tools, etc. It includes performance improvement activities that are continuous and focused.

- **Political**--the informal and formal aspects of performance management. This front includes boundary spanning, internal communication, opportunity sensing and capturing, working with various bases of power, paying attention to stakeholders, working with pivotal people in positions of power to ensure they are on-board, etc. It incorporates managing, coping, dealing with infighting, turf wars, personality conflicts, style conflicts, disagreements in method and in who is leading methods for making the transformation. It is the informal system, for dealing with these issues.

This then provides a brief description of Sink’s Grand Strategy System, the method CMI utilizes to manage their organizational, continuous improvement efforts. The strategic integration and deployment of CMI’s fronts are what manages the performance improvement initiatives throughout the organization. Examples of initiatives in each of the fronts are portrayed in table 2.4. Please note that since the fronts are not mutually exclusive, some initiatives are portrayed within multiple fronts.

Front	Examples of Initiatives in the Fronts
Planning	<ul style="list-style-type: none"> • Planning off-sites, recycles, sessions, etc. • Plan development • "The Wall" development
Measurement	<ul style="list-style-type: none"> • Visible management/measurement system (VMS) • Chartbook • Level of effort tracking • Gainsharing

Infrastructure	<ul style="list-style-type: none"> • Self managing teams • Affinity groups
Education, Training, & Development	<ul style="list-style-type: none"> • Deming, Covey, Kepner Tregoe, Weisbord Seminars • SPQA • University classes
Motivation	<ul style="list-style-type: none"> • Gainsharing • ET&D opportunities • QWL events • VT Compensation and benefits package
Culture	<ul style="list-style-type: none"> • QWL events • Planning sessions, etc.
Communication	<ul style="list-style-type: none"> • All hands meetings • VMS • Gainsharing
Technology	<ul style="list-style-type: none"> • Network system • Resource center • Facilities
Political	<ul style="list-style-type: none"> • VT top management briefing • SPQA

(Table 2.4)

Collectively, the GSS ensures that all CMI performance improvement initiatives are managed in a strategic and integrated manner.

F.2 Motivation and the Motivation Front

The GSS is used to manage organizational level continuous improvement. Gainsharing, a subset of compensation management, fits within the GSS as a component of the Motivation Front. To describe how gainsharing fits within CMI, I will first describe motivation.

Motivation was derived from the Latin word “movere,” which means “to move” (Steers

and Porter, 1991). Steers and Porter (1991) state that when we discuss motivation we are primarily concerned with what energizes human behavior, what directs or channels such behavior, and how this behavior is maintained or sustained. The key word in each component of Steers and Porter's statement is "behavior." Baum (1994) argues - persuasively that as scientists we should focus on behavior (e.g., behavior of atoms, chemicals, plants, organisms, humans). He adds that a common mistake is the confusion of the name of categories of behavior with behavior itself. In the case of motivation, motivation is the categorical name for behaviors we consider "motivated." Motivation itself does not exist. A person thus does not possess motivation, he/she exhibits behaviors that we call motivated behaviors. My operational definition of motivation then, is that it is the name of the category of behaviors that involve the initiation, direction, and sustainment of individual behavior.

The primary goal, however, is high performance. Sink and Tuttle (1989) state that the goals of all managers in all areas should be twofold: 1) Perform, get the job done; and 2) Continuously strive to improve performance (their own, their group's, the system's, the organization's). What appears to be misunderstood though, is that the presence of motivation does not necessarily guarantee high performance. Motivation is but one of three components that must be managed to achieve high performance. Blumberg and Pringle's (1982) model best describe the relationship of motivation to performance. They describe individual performance as a function of capacity, motivation, and opportunity (see figure F.1). For example, if an individual were to be highly motivated to perform as an

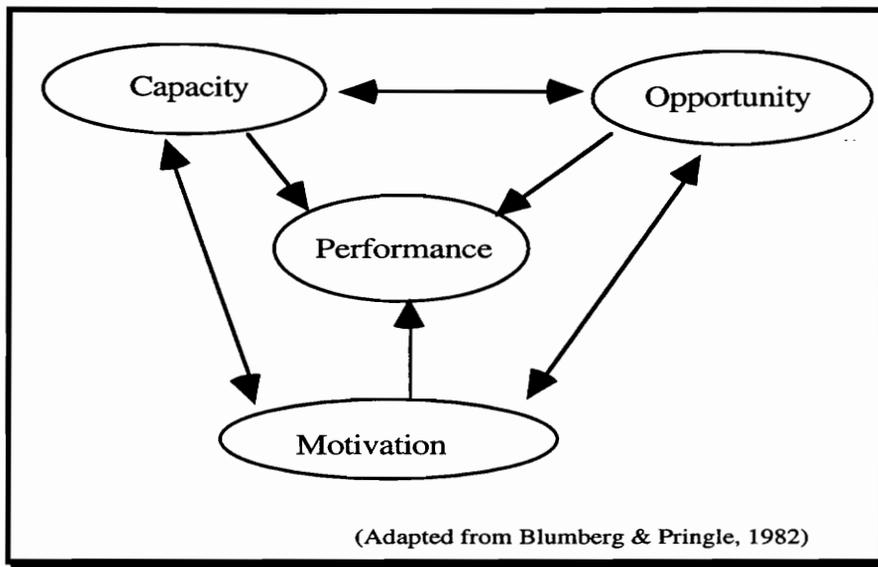


Figure F.1: Interaction of the Dimensions of Motivation

accountant and have the job of an accountant (opportunity) but have very little or no training (capacity) as an accountant then high performance would be quite unlikely. Similarly, if an individual were to be highly motivated to perform as a computer technician and have the training of a computer technician (capacity) but not have the time (opportunity) due to higher priority responsibilities then again, high performance would be unlikely. Motivation, capacity, and opportunity must be combined to assure high individual performance. The capacity of individuals is managed primarily through the education, training, and development front. Opportunity of individuals is managed primarily through the infrastructure and technology fronts. The motivation of individuals is managed primarily through the motivation front. Components of CMI's motivation front are portrayed in figure F.2.

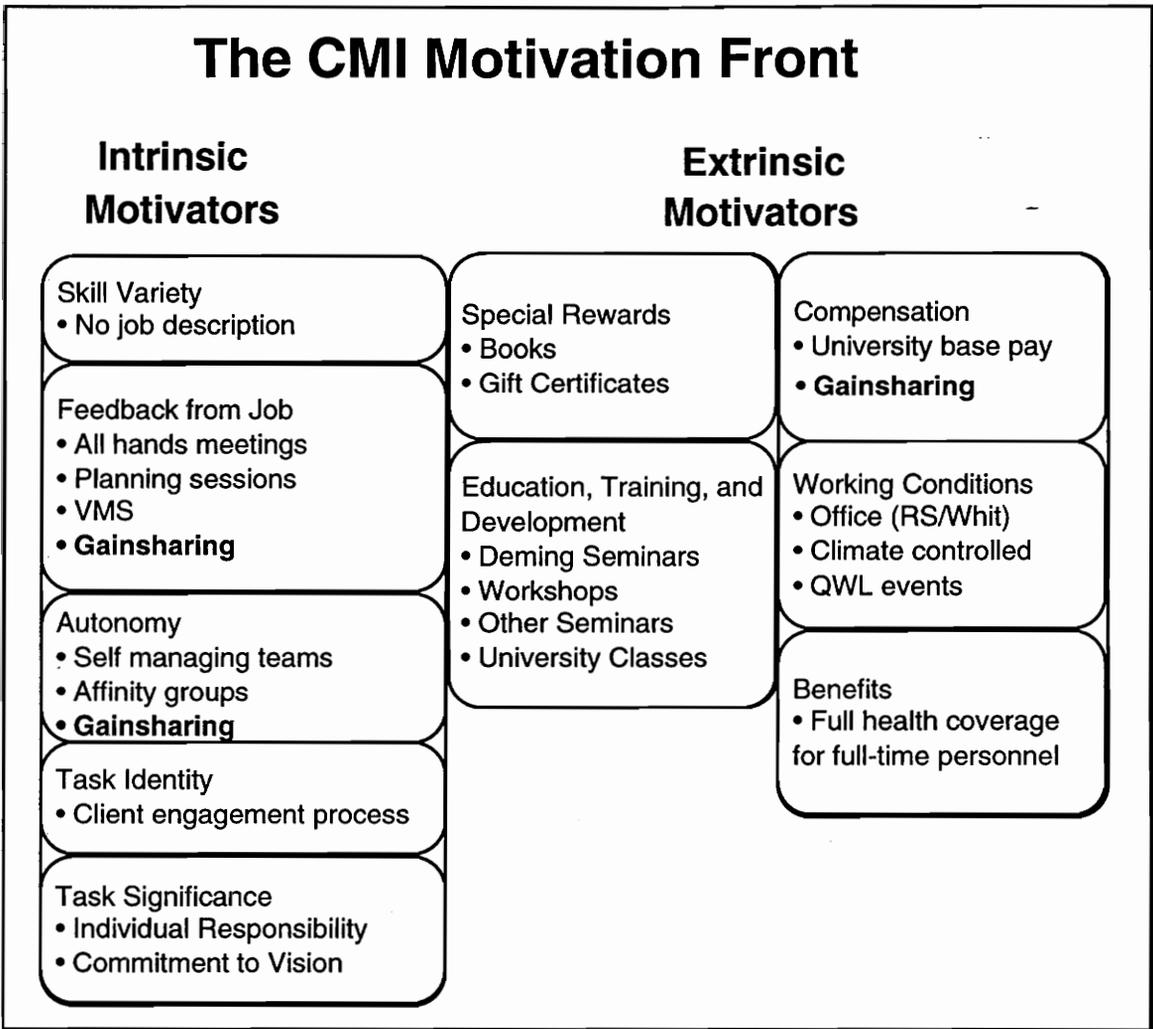


Figure F.2: CMI Motivation Front

Although the definition of motivation does little to aid the practicing manager, operationalizations of motivation in the form of motivational theories provide greater insight into the reduction to practice of motivation. Theories discussed within this body of knowledge include: The Hierarchy of Needs, Two-Factor Theory, Job Characteristics Theory, Equity Theory, Expectancy Theory, Goal-Setting Theory, and Reinforcement Theory. Each theory contributes a perspective and adds a piece to the puzzle of managing

motivation. It is the reduction to practice of the theories of motivation that allow motivation to be managed.

The Hierarchy of Needs

Maslow (1943) states that individuals possess five basic needs: physiological, safety, love, esteem, and self-actualization. Physiological needs are biological requirements and include such things as food, shelter, sex, and water. Safety needs include such things as lack of endangerment, preference for a dependable job, and desire for insurance. Love needs include such things as belongingness, social relations, and affectionate relations. Esteem needs include self-respect, respect from others, achievement, reputation, prestige, and confidence. Self-actualization needs describe the need to be doing what one is fitted for doing. “Self-actualization might be phrased as the desire to become more and more what one is, to become everything that one is capable of becoming” (Maslow, 1943). These needs tend to vary in importance for individuals in the form of a pyramid (see figure F.3) with the physiological needs on the bottom and the self-actualization needs on the top.

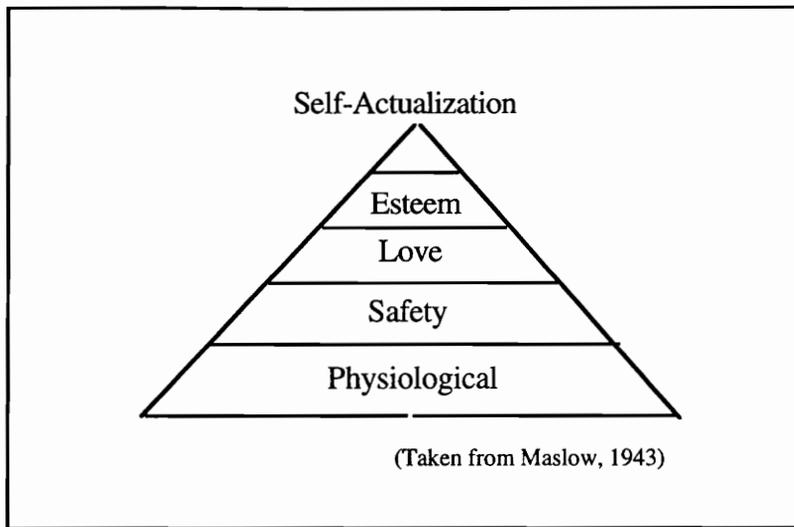


Figure F.3: Maslow's Hierarchy of Needs

The basic idea is that individuals will be motivated by their lower order needs before they will be motivated by their higher order needs. For example, the love needs would have to be satisfied before the esteem needs became motivators. Maslow's theory is complicated by the fact that behaviors may be motivated by multiple needs and the hierarchy is different for different individuals (Adler, 1986; Maslow, 1943). Maslow believed most individuals were somewhat satisfied in their physiological, safety, and love needs so management should focus on satisfying the worker's esteem and self-actualization needs. "A man who is thwarted in any of his basic needs may fairly be envisaged simply as a sick man. Who is to say that a lack of love is less important than a lack of vitamins? A healthy man is primarily motivated by his needs to develop and actualize his fullest potentialities and capacities. If a man has any other basic needs in an active, chronic sense, then he is simply an unhealthy man. He is as surely as sick as if he had suddenly developed a strong salt hunger or calcium hunger" (Maslow, 1943).

Two-Factor Theory or Motivator-Hygiene Theory

Herzberg (1962) found that the factors in a job that resulted in job satisfaction were not the same factors that resulted in job dissatisfaction. “The distinguishing characteristic of these two sets of factors is whether they describe the job content or the job context” (Herzberg, 1962). He called those factors intrinsic to the job (job content) that resulted in job satisfaction (achievement, recognition, work itself, responsibility, and advancement) motivators and those factors extrinsic to the job (job context) that resulted in job dissatisfaction (working conditions, interpersonal relations-supervision, salary, supervision-technical, company policy and administration) hygiene factors. High levels of motivators resulted in motivation but low levels of motivators did not result in dissatisfaction. Whereas, low levels of hygiene factors resulted in job dissatisfaction but high levels of hygiene factors did not result in job satisfaction. Herzberg also found that hygiene factors affected worker attitudes for a short period of time and motivators affected worker attitudes for a long period of time.

Gibson, Ivancevich, & Donnelly (1991) have stated that Herzberg's work has received a great deal of criticism from the academic community regarding the validity of his results. Yet his theory remains popular among practicing managers due to its simplicity, face validity, and utility. Gibson (et. al.) has stated that Herzberg's theory serves to highlight the different viewpoints between the practitioner and the academician.

Job Characteristics Theory

Hackman and Oldham (1980) postulate that the outcomes of high internal work motivation, high "growth" satisfaction, high general job satisfaction, and high work effectiveness are caused by three critical psychological states (experienced meaningfulness of the work, experienced responsibility, and knowledge of results). Figure F.4 portrays the relationship

of the variables of job characteristics theory. Experienced meaningfulness of the work is affected by skill variety, task identity, and task significance. Skill variety is the degree to which the job requires the use of different skills and abilities. Task identity is the degree to which a job is "whole" and continues from beginning to end with a visible outcome. Task significance is the degree to which the job impacts the larger system. Experienced responsibility is affected by autonomy. Autonomy is the degree to which the job provides the individual with freedom to do what is necessary to complete the job. Knowledge of results is affected by feedback. Feedback is the degree to which the individual receives information on the performance of the job. Skill variety, task identity, task significance, autonomy, and feedback make up what Hackman and Oldham call core job characteristics.

The relationship of the core job characteristics & the critical psychological states and the critical psychological states & the outcomes is moderated by knowledge and skills, growth need strength, and context satisfaction. Knowledge and skills are the abilities of the individual. Growth need strength is the extent to which the individual values learning and personal accomplishment. Context satisfaction is the extent to which the individual is satisfied with the aspects of the work itself (e.g., pay, relationships with co-workers).

Hackman and Oldham (1980) believe that all jobs have what is called a motivating potential score (MPS). The MPS is the overall potential of a job to foster internal work motivation on the part of the individuals performing the job. The MPS is the potential of the job itself (the work content) to provide conditions that enhance motivated behavior.

$$\text{MPS} = \left[\frac{\text{skill variety} + \text{task identify} + \text{task significance}}{3} \right] \times \text{autonomy} \times \text{feedback}$$

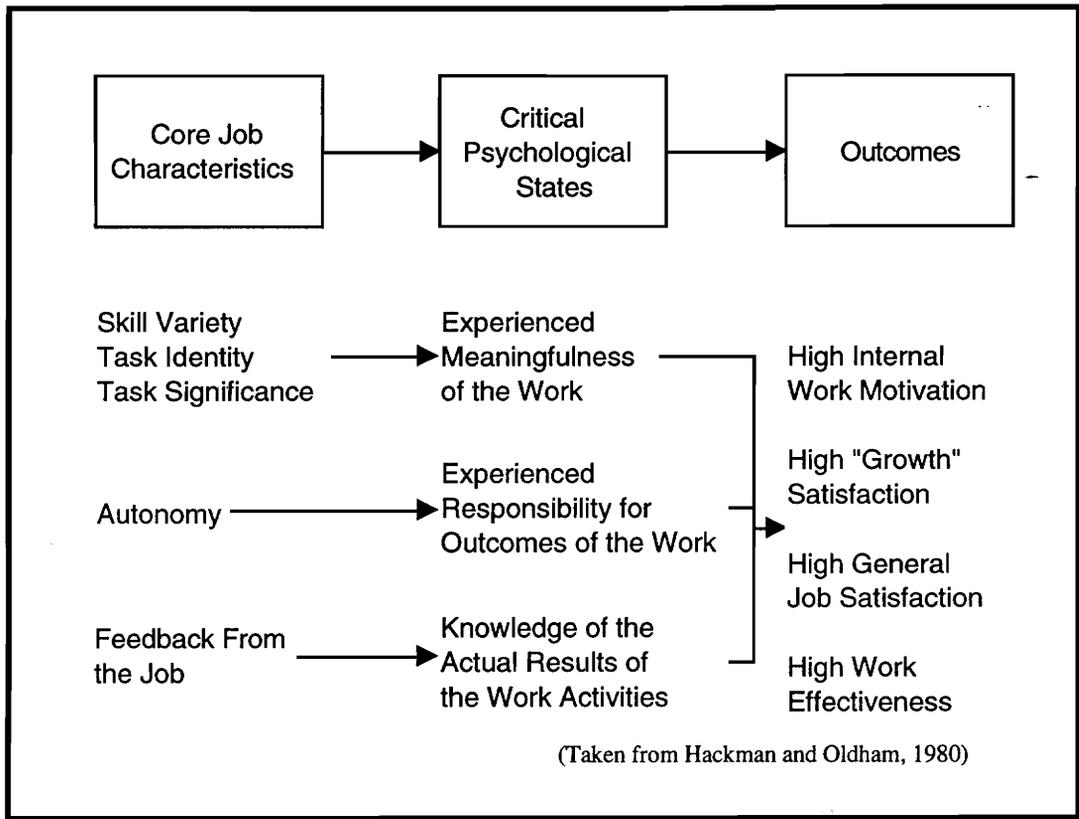


Figure F.4: Job Characteristics Theory

2.3.4 Equity Theory

Mowday (1991) states that "individuals may compare their outcomes and contributions (e.g, to an organization) in an exchange with the outcomes and contributions of the person with whom they are interacting. Where there is relative equality between the outcomes and contributions of both parties to an exchange, satisfaction is likely to result from the interaction." Equity theory states that individuals in organizations compare the ratio of their outcomes (rewards) to inputs (contributions) to the ratio of outcomes (rewards) to inputs (contributions) of others in similar situations/positions. Dissatisfaction is likely to result when the ratios are unequal (see table F.1). To reduce the dissatisfaction, individuals may:

1) alter their outcomes or rewards, 2) alter their inputs or contributions, 3) cognitively distort inputs or outcomes, 4) leave the job, 5) take actions to alter the inputs or contributions of the other, 6) change the comparison other.

Table F.1: Equity Theory

Satisfaction	Dissatisfaction
$\frac{O_p}{I_p} = \frac{O_o}{I_o}$	$\frac{O_p}{I_p} > \frac{O_o}{I_o}$ or $\frac{O_p}{I_p} < \frac{O_o}{I_o}$

Expectancy Theory

Pinder (1984) states that "people's behavior results from conscious choices among alternatives, and these choices (behaviors) are systematically related to psychological processes, particularly perception and the formation of beliefs and attitudes." Expectancy theory attempts to predict people's choices based upon three variables: valance, expectancy, and instrumentality. Valance is the value of an outcome. Expectancy is the perceived probability of accomplishing an outcome. Instrumentality is the strength of the relationship between outcome and the second-level outcome. The relationship between the three variables is usually stated as multiplicative (e.g., Pinder, 1984) although some research supports the possibility that the relationship is additive (e.g., Stahl and Harrell, 1981). Pinder's (1984) portrayal of expectancy theory is shown in table F.2.

Table F.2: A Summary of Expectancy Theory

$F_i = f \sum_{i=1}^n (E_{ij} V_j)$	and	$V_j = f \left[\sum_{k=1}^n I_{jk} V_k \right]$
Where:		
F _i = the psychological force to perform an act (i)		
E _{ij} = the strength of the expectancy that the act will be followed by the outcome j		
V _j = the valance for the individual of outcome j		
I _{jk} = instrumentality of outcome j for attaining second-level outcome k		
V _k = valance of the second-level outcome k		
(taken from Pinder, 1984)		

Reinforcement Theory

Reinforcement theory basically states that behavior is a function of its consequences (Gibson, Ivancevich, and Donnelly, 1991). The consequences are based upon the type of reinforcer (positive reinforcer, negative reinforcer, punishment, and extinction) and the timing or schedule of the reinforcer. A positive reinforcer (or reward) is anything that *increases* the likelihood of a behavior through the *application* of something after the behavior (e.g., a bonus system to reward high performance). A negative reinforcer is anything that *increases* the likelihood of a behavior through the *removal* of something after the behavior (e.g., improving customer service to avoid customer complaints). Punishment is anything that *decreases* the likelihood of a behavior through the *application* of something after the behavior (e.g., public criticism for low performance). Extinction is anything that *decreases* the likelihood of a behavior through the *removal* of something after the behavior (e.g., praise for high performance that is no longer given).

There are five types of reinforcement schedules: continuous, fixed interval, variable interval, fixed ratio, and variable ratio. Continuous reinforcement reinforces every time the behavior is exhibited. When an individual is learning a new activity then continuous reinforcement results in accelerated performance (e.g., constant feedback for a new job). Once the new activity is learned then intermittent schedules (schedules that do not call for reinforcement every time the behavior is exhibited) may be used instead. Fixed interval reinforces after a specified period of time (e.g., salary check). Variable interval reinforces after a variable period of time (e.g., praise from a superior). Fixed ratio reinforces after a given number of units (e.g., piece rate). Variable ratio reinforces after a variable number of units (e.g., reward for quality work).

Goal-Setting Theory

Proposed by Latham & Locke (1979), goal-setting theory states that individuals with harder goals that they accept will outperform individuals with mediocre goals, individuals with harder goals that are not accepted, and individuals with no goals. Three factors moderate goal setting theory: goal difficulty, goal specificity, and goal commitment (Gibson, Ivancevich, and Donnelly, 1991). The extent to which a goal is challenging or "hard" is called goal difficulty. The extent to which the goal is understood is called goal specificity. The amount of effort used to attain a goal is called goal commitment. Goal-setting theory is portrayed in Latham and Locke's (1979) Goal-Setting Model (see figure F.5).

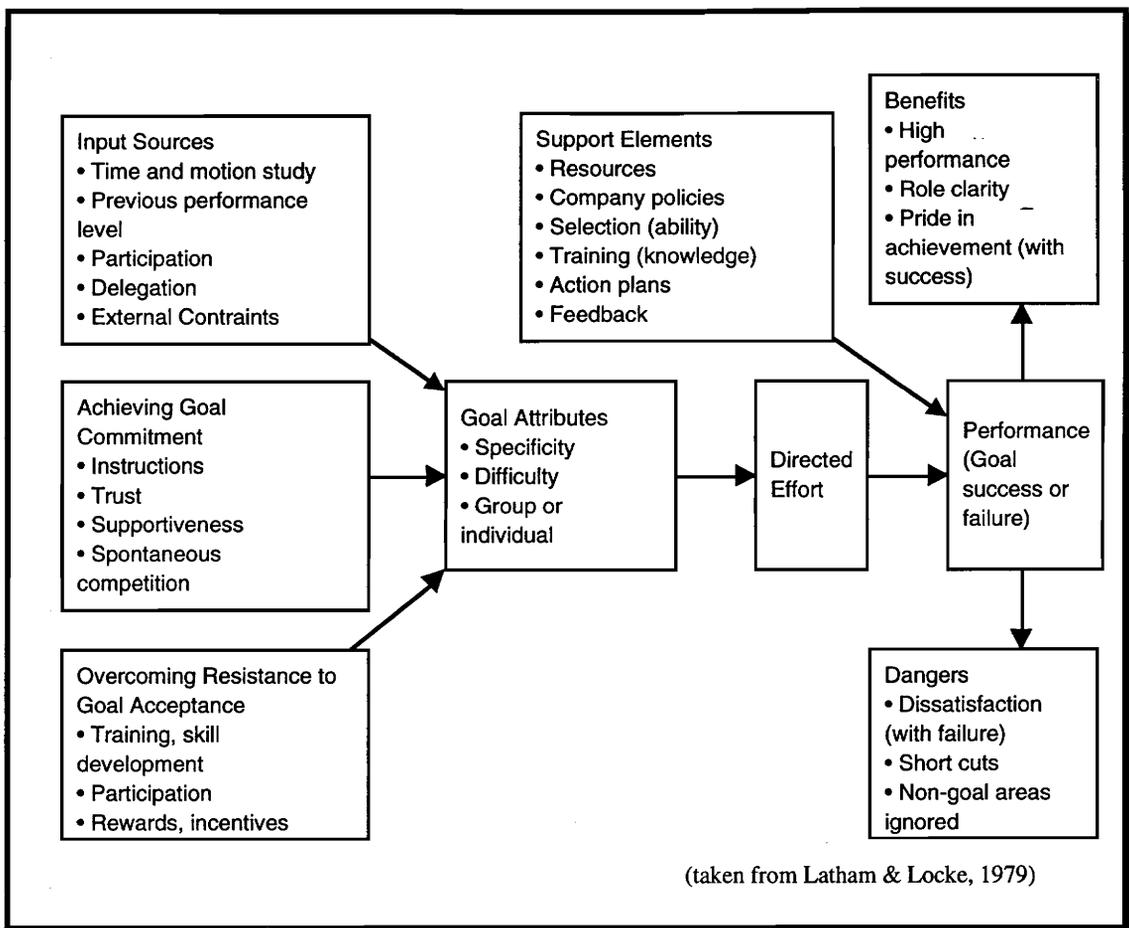


Figure F.5: Goal Setting Theory

F.3 Compensation Management

Henderson (1994) states that the leaders in an organization design, develop, and implement reward systems to focus employee attention on the specific behaviors the organization considers necessary to accomplish its mission, achieve its goals and objectives, and realize its vision. However, Kerr (1975) cautions that it is often the case that we hope for A while rewarding B. In other words, the link between the desired behaviors and the rewards is often unclear and unmanaged. The objective of compensation management is to manage the link between behaviors on the job and compensation/rewards.

Henderson (1994) states that when we talk about the reward system we are discussing anything that an employee may value or desire and that the employer is willing to offer in exchange for employee contributions. He divides the reward system into two sets of components: compensation and noncompensation. The compensation category is comprised of rewards that are financial or have a financial value (e.g., salary, health benefits, gainsharing, bonuses; see figure F.6). All other rewards are considered noncompensation (e.g., participative management, quality of work life, learning organization; see figure F.7). As gainsharing is compensation management tool, the noncompensation system will not be specifically discussed.

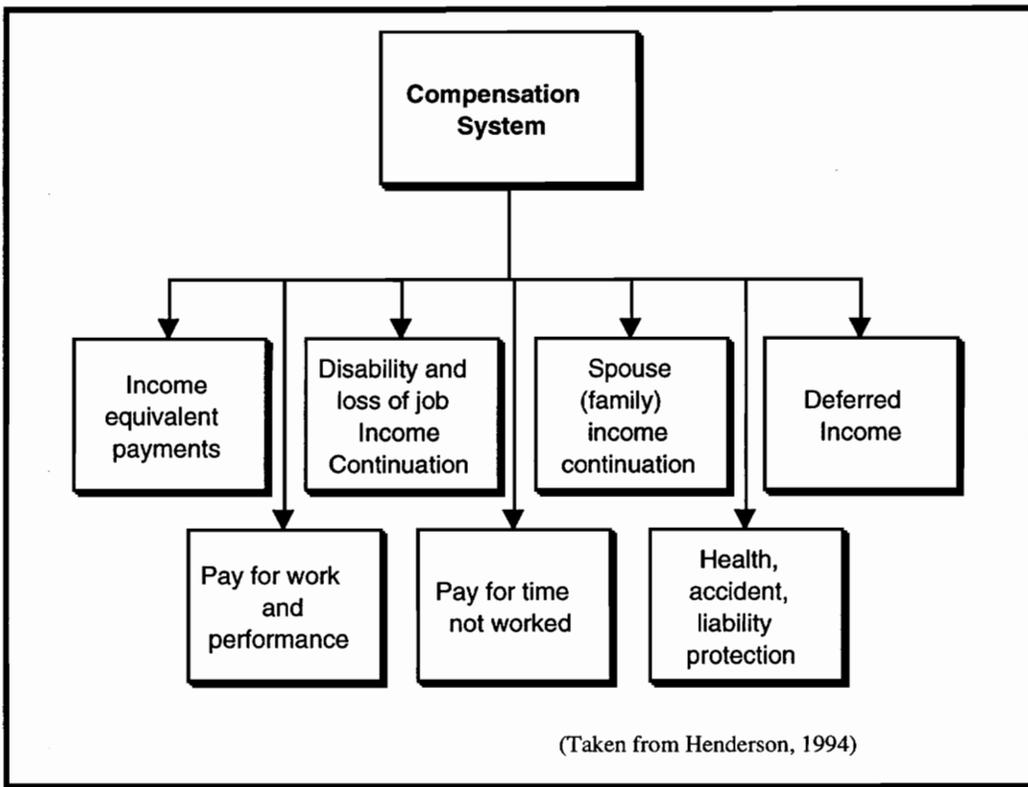


Figure F.6: Compensation System

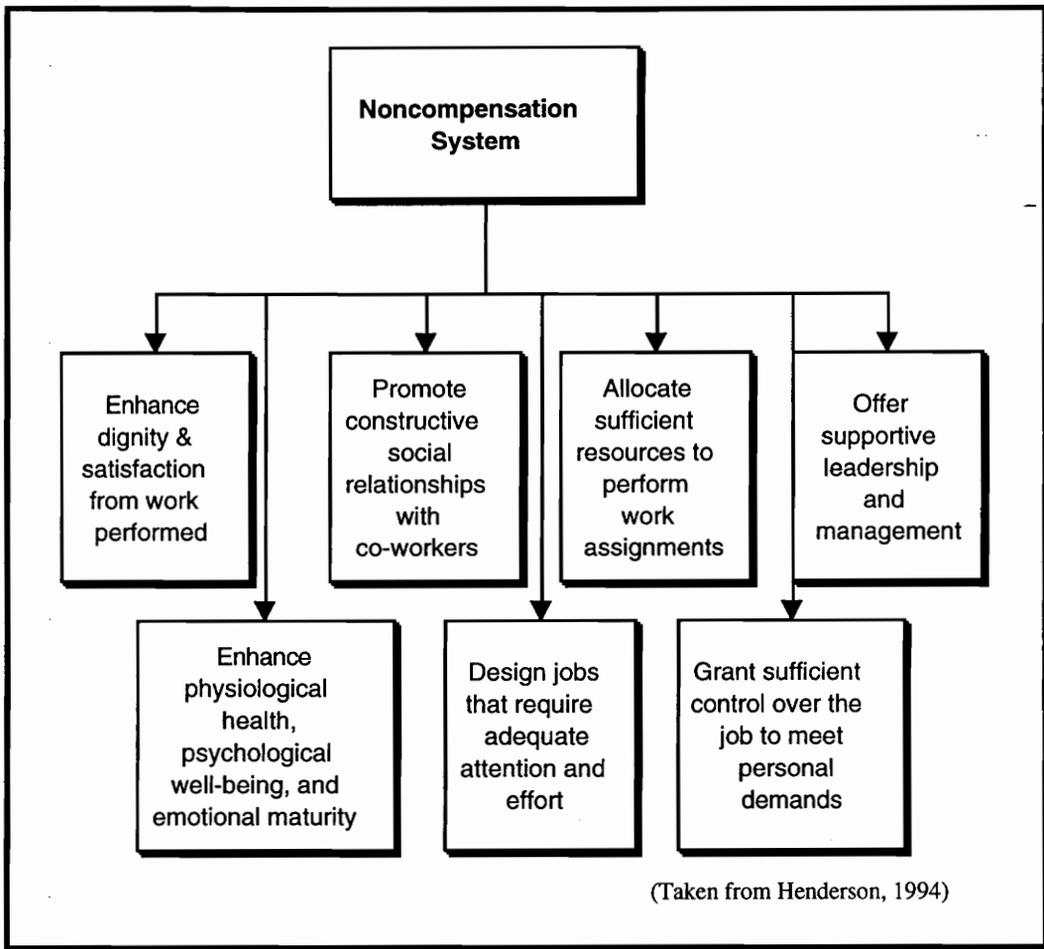


Figure F.7: Non-Compensation System

The traditional tools of managing the compensation system include job analysis, job description, and job evaluation. Job analysis involves determining what actually occurs on the job. The job description is used to portray the desired behaviors of the job. The job evaluation is used to determine the worth of the job to the organization. These three tools are used to construct traditional, organizational compensation systems.

The job analysis is used to measure the job and determine what behaviors are currently taking place on the job. The emphasis is on gathering data. The basic steps to conduct a job analysis are portrayed in table F.3.

Table F.3: Steps to Conduct a Job Analysis

- 1) Determine the purpose of the job analysis (e.g., employment, training, compensation).
- 2) Learn the structure, operations, and jobs of the organization.
- 3) Identify methods for collecting the job content data.
- 4) Plan the steps to conduct the job analysis.
- 5) Execute the plan.

(Adapted from Henderson, 1994)

After the job analysis is completed, the data from the job analysis is converted into information using the job description. As its name implies, the job description attempts to outline and describe the behaviors that are expected from individuals on a job. The job description delimits the domain of responsibility of an employee. Components of a job description include: job identification, responsibilities and duties, accountabilities, and specifications.

The information from the job description is used to evaluate the job. The job evaluation determines the worth of a job to the organization. Henderson (1994) states that there are three major phases in conducting the job evaluation. They are:

- 1) identifying a hierarchy of jobs by worth, using some kind of job evaluation methodology (e.g., market pricing approach, maturity curve, compensable factors, rating scales);
- 2) investigating the marketplace to identify what other organizations are paying workers

- in comparable jobs and;
- 3) combining job worth data and market data in some manner that results in an organizational pay structure.

Collectively, these three tools work together to develop the organizational pay structure.

Appendix G - References

- Adler, N.J. (1986). Cross-Cultural Motivation. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Baum, W.B. (1994). Understanding Behaviorism: Science, Behavior, and Culture. New York: Harper Collins College Publishers.
- Beck, D. (1992). Implementing a Gainsharing Plan: What Companies Need to Know. Compensation & Benefits Review, 24(1), 21-33.
- Berman, S.J. (1994, Autumn). Gain Management Makes Productivity Soar at GST Steel. National Productivity Review, 503-515.
- Blumberg, M. & Pringle, C.D. (1982). The Missing Opportunity in Organizational Research: Some Implications for a Theory of Work Performance. Academy of Management Review, 7(4), 560-569.
- Bullock, R.J. & Bullock, P.F. (1982, Autumn). Gainsharing and Rubik's Cube: Solving System Problems. National Productivity Review, 396-407.
- Bullock, R.J. & Lawler, E.E. (1984, Spring). Gainsharing: A Few Questions, and Fewer Answers. Human Resource Management, 23-40.
- Bullock, R.J. & Tubbs, M.E. (1990). A Case Meta-Analysis of Gainsharing Plans as Organization Development Interventions. The Journal of Applied Behavioral Science, 26(3), 383-404.
- Collins, D., Hatcher, L., & Ross, T.L. (1993). The Decision to Implement Gainsharing: The Role of Work Climate, Expected Outcomes, and Union Status. Personnel Psychology, 46, 77-104.
- Cooper, C.L., Dyck, B., & Frohlich, N. (1992). Improving the Effectiveness of Gainsharing: The Role of Fairness and Participation. Administrative Science Quarterly, 37, 471-490.
- DeBettignies, C.W. (1989, Summer). Improving Organization-Wide Teamwork through Gainsharing. National Productivity Review, 8(3), 287-294.
- Deming, W.E. (1993). The New Economics for Industry, Government, Education. MIT: Center for Advanced Engineering Study.
- Doherty, E.M., Nord, W.R., & McAdams, J.L. (1989). Gainsharing and Organization Development: A Productive Synergy. The Journal of Applied Behavioral Science, 25(3), 209-229.

- Doyle, R.J. & Doyle, P.I. (1992). Gainmanagement: A Process for Building Teamwork, Productivity, & Profitability Throughout Your Organization. New York: AMACOM.
- Emory, C.W. & Cooper, D.R. (1991). Business Research Methods. Homewood, IL: Irwin.
- Ewing, J.C. (1993). Gainsharing Plans: Two Key Factors. Compensation and Benefits Review, 49-53.
- Frankfort-Nachmias, C. & Nachmias, D. (1992). Research Methods in the Social Sciences. New York: St. Martin's Press.
- Gibson, J.L., Ivancevich, J.M., & Donnelly, J.H. (1991). Organizations Behavior Structure Processes. Homewood, IL: Irwin.
- Gowen, C.R. (III) (1990). Gainsharing Programs: An Overview of History and Research. Journal of Organizational Behavior Management, 11(2), 77-99.
- Gowen, C.R. (III) & Jennings, S.A. (1990). The Effects of Changes in Participation and Group Size on Gainsharing Success: A Case Study. Journal of Organizational Behavior Management, 11(2), 147-169.
- Gross, S.E. & Bacher, J.P. (1993, January-February). The New Variable Pay Programs: How Some Succeed, Why Some Don't. Compensation & Benefits Review, 51-56.
- Hackman, J.R. & Oldham, G.R. (1980). Work Redesign. Reading, Mass: Addison-Wesley.
- Hammer, T. (1989). Gainsharing. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Hamner, W.C. (1974). Reinforcement Theory and Contingency Management in Organizational Settings. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Hanlon, S.C., Meyer, D.G., & Taylor, R.R. (1994, March). Consequences of Gainsharing: A Field Experiment Revisited. Group & Organizational Management, 19(1), 87-111.
- Hatcher, L., Ross, T.L., & Collins, D. (1989). Prosocial Behavior, Job Complexity, and Suggestion Contribution Under Gainsharing Plans. The Journal of Applied Behavioral Science, 25(3), 231-248.
- Hatcher, L. & Ross, T.L. (1989). From Individual Incentives to an Organization-wide Gainsharing Plan: Effects on Teamwork and Product Quality. Journal of Organizational Behavior, 12, 169-183.
- Henderson, R.I. (1994). Compensation Management Rewarding Performance. Englewood Cliffs, NJ: Prentice-Hall.

- Herzberg, F. (1962). New Approaches in Management Organization and Job Design. In M.T. Matteson & J.M. Ivancevich, Management and Organizational Behavior Classics. Homewood, IL: Irwin.
- Kerr, S. (1975). On the Folly of Rewarding A, While Hoping for B. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Kohn, A. (1993). Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and Other Bribes. New York: Houghton Mifflin Company.
- Kohn, A. (1993, September-October). Why Incentive Plans Cannot Work. Harvard Business Review, 54-63.
- Latham, G.P. & Locke, E.A. (1979). Goal Setting-A Motivational Technique that Works. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Lawler, E.E. (1990). Strategic Pay: Aligning Organizational Strategies and Pay Systems. San Francisco: Jossey-Bass.
- Leedy, P.D. (1993). Practical Research: Planning and Design. New York: Macmillan.
- Markham, S.E., Scott, K.D., & Cox, W.G. (1992). The Evolutionary Development of a Scanlon Plan. Compensation & Benefits Review, 24(2), 50-56.
- Markham, S.E., Scott, K.D., & Little, B.L. (1992). National Gainsharing Study: The Importance of Industry Differences. Compensation & Benefits Review, 24(1), 34-45.
- Maslow, A.H. (1943). A Theory of Human Motivation. In M.T. Matteson & J.M. Ivancevich, Management and Organizational Behavior Classics. Homewood, IL: Irwin.
- Masternak, R.L. (1992, Winter). Gainsharing Programs at Two Fortune 500 Facilities: Why One Worked Better. National Productivity Review, 71-86.
- Mawhinney, T.C. & Gowen, C.R. (III) (1990). Gainsharing and the Law of Effect as the Matching Law: A Theoretical Framework. Journal of Organizational Behavior Management, 11(2), 61-75.
- Milkovich, G. & Milkovich, C. (1992). Strengthening the Pay-Performance Relationship: The Research. Compensation & Benefits Review, 24(6), 53-62.
- Miller, C.S. & Schuster, M.H. (1987). Gainsharing Plans: A Comparative Analysis. Organizational Dynamics, 44-67.
- Mowday, R.T. (1991). Equity Theory Predictions of Behavior in Organizations. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Musgrave, K. (1982). Some Experiments with Improshare. In IIE, Gainsharing: A Collection of Papers. Norcross, GA: IIE Press.

- Nickel, J.E. & O'Neal, S. (). Small-Group Incentives: Gain Sharing in the Microcosm. Compensation and Benefits Review, 22-29.
- Niebel, B.W. (1988). Motion and Time Study. Homewood, IL: Irwin.
- Ott, R.L. (1993). An Introduction to Statistical Methods and Data Analysis. Belmont, CA: Duxbury Press.
- Patton, M.Q. (1990). Qualitative Evaluation and Research Methods. Newbury Park: Sage.
- Pinder, C.C. (1984). Valence-Instrumentality-Expectancy Theory. In R.M. Steers & L.W. Porter, Motivation and Work Behavior. New York: McGraw-Hill.
- Ringham, A.J. (1984, Spring). Designing a Gainsharing Program to Fit a Company's Operations. National Productivity Review, 131-144.
- Rossler, P.E. (1988). Using a Productivity Measurement Model to Drive Gainsharing. Unpublished Master's thesis, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Rossler, P.E. & Koelling, C.P. (1993, Summer). The Effect of Gainsharing on Business Performance at a Papermill. National Productivity Review, 365-382.
- Schuster, M. (1987, Winter). Gain Sharing: Do It Right the First Time. Sloan Management Review, 17-25.
- Schuster, J.R. & Zingheim, P.K. (1993, March-April). The New Pay: Key Design Issues. Compensation and Benefits Review, 27-34.
- Schuster, J.R. & Zingheim, P.K. (1992). The New Pay: Linking Employee and Organizational Performance. New York: Lexington Books.
- Sink, D.S. & Monetta, D.J. (1991). Continuous Improvement Engineering: Implementing a Grand Strategy System in the Office of New Production Reactors. QPM, 9(3), 43-57.
- Sink, D.S. & Poirier, D. (1994). By What Method?: A Case Study Update on GSS Applications. 1994 International Engineering Conference. Norcross, GA: IIE Press.
- Sink, D.S. & Rossler (1988). Compensation Management Systems in the Organization of the Future: The Role of Gainsharing. IIE Spring Conference Proceedings. Norcross, GA: IIE Press.
- Sink, D.S. & Tuttle, T.C. (1989). Planning and Measurement in Your Organization of the Future. Norcross, GA: IIE Press.
- Stahl, M.J. & Harrell, A.M. (1981). Modeling Effort Decisions with Behavioral Decision Theory: Toward an Individual Differences Model of Expectancy Theory. Organizational Behavior and Human Performance, 27, 303-325.

Steers, R.M. & Porter, L.W. (1991). Motivation and Work Behavior. New York: McGraw-Hill.

Thomas, B.W. and Olson, M.H. (1988, May). Gainsharing: the Design Guarantees Success. Personnel Journal.

Turner, W.C., Mize, J.H., Case, K.E., & Nazemetz, J.W. (1993). Introduction to Industrial and Systems Engineering. Englewood Cliffs, NJ: Prentice Hall.

Wallace, W. (1971). Introduction: Science and Three Alternatives. The Logic of Science in Sociology. Chicago: Aldine-Atherton.

Webster (1991). Webster's New World Dictionary. Cleveland: Simon and Schuster.

White, K.J. (1979). The Scanlon Plan: Causes and Correlates of Success. Academy of Management Journal, 22 (20).

Appendix H - Vita

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Objective: Industrial/Management Systems Engineer; special interest in planning systems, continuous improvement (TQM), organizational and team reward systems, organizational performance improvement, and lean manufacturing.

Education: M.S. in Industrial and Systems Engineering, Concentration in Management Systems Engineering, May 1995, Virginia Polytechnic Institute and State University, Blacksburg.

B.S. in Industrial and Systems Engineering, May 1993, Virginia Polytechnic Institute and State University, Blacksburg.

Experience: Assistant Engineer, June, 1995 - present, RWD Technologies, Columbia, MD.

- Developed courseware and simulation materials to help Chrysler Corporation deploy lean manufacturing.

Graduate Research Associate, June 1993 - June, 1995, Virginia Quality and Productivity Center Industrial and Systems Engineering Dept., Va Tech, Blacksburg, Va.

- Trained and facilitated process action teams (PATs) for the US Navy AEGIS Program to deploy total quality leadership (TQL) throughout the organization.
- Served on project teams to implement the strategic performance improvement planning process (SPIPP) and deploy total quality management (TQM/L) in the following organizations: Environmental Protection Agency (EPA), Portsmouth Public Schools, US Navy Explosive Ordnance Disposal Technology Division, and US Navy Ship Self Defense Program.

Systems Administrator, April 1993 - June 1994, Virginia Quality and Productivity Center, Industrial and Systems Engineering Dept., Va Tech, Blacksburg, Va.

- Administered the VQPC's network system (wide area network (WAN) consisting of 20 work stations and 2 dedicated servers on an ethernet backbone).

Current Affiliations: Institute for Industrial Engineers, Jan 1991 - present.
American Society for Quality Control, Nov 1992 - present.
American Society for Training and Development, Nov 1992 - present.

Research Interests: Planning, large-scale organizational change, organizational measurement systems, continuous performance improvement, organizational/team rewards, business process re-engineering, and lean manufacturing.

