

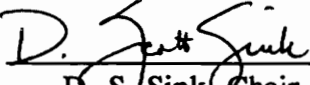
**DEVELOPMENT OF A GENERAL GAINSHARING MODEL  
AND SPECIFYING IT FOR A GOVERNMENT, RDT&E  
FACILITY**

by

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DEVELOPMENT OF A GENERAL GAINSHARING MODEL  
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Industrial and Systems Engineering

(ABSTRACT)

The overall research objective of this thesis effort was to develop a general model depicting the major design parameters for a gainsharing system. This model was then validated and specified for a government, Research, Development, Test and Evaluation (RDT&E) facility. Companies interested in gainsharing will be able to use the general model as a base to begin building their own individualized system. Government, RDT&E facilities will be able to integrate the specific issues that were identified into the development of a gainsharing system to suit their incentive needs.

An extensive review of the literature was conducted and a great deal has been learned about gainsharing and related areas. Many case examples were studied to understand how different organizations have approached gainsharing. A great deal of information was gathered on how government, RDT&E organizations function and the many policies and restrictions they have to operate within. This enabled a general gainsharing model to be developed.

A rigorous research methodology, including interviews and surveys, was used to validate the general model and identify specification issues. Representatives from organizations with extensive gainsharing experience and gainsharing experts provided input to validate the general model. The Naval Air Warfare Center Aircraft Division, Trenton (NAWCADTRN) was used as a prototype organization to specify the general model for a government, RDT&E facility. Finally, interviews with NAWCADTRN managers and customers and an organization-wide survey of employees helped to identify gainsharing issues that are specific to their organization.

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## ACRONYMS

BRAC	Base Realignment and Closure Commission
CO	Commanding Officer
CNSY	Charleston Naval Shipyard
DOD	Department of Defense
DON	Department of the Navy
DTIC	Defense Technical Information Center
EI	Employee Involvement
FPM	Federal Personnel Manual
FY	Fiscal Year
GAO	Government Accounting Office
GS	Gainsharing
GS	General Schedule
GM	General Management
IPAS	Individual Performance Award System
I&M	Improvement and Modernization
MDEC	McDonnell Douglas Electronics Company
MEO	Most Efficient Organization
MRTFB	Major Range Test Facility/Base
M&R	Maintenance and Repair
MTP	Manage to Payroll
NAC	Naval Avionics Center
NADEP	Naval Aviation Depot
NAPC	Naval Air Propulsion Center
NARDAC	Naval Regional Data Automation Center
NAST	Naval Air Systems Team
NAVAIR	Naval Air Systems Command
NAWCADTRN	Naval Air Warfare Center Aircraft Division, Trenton
NAFS	Newark Air Force Station

NPRDC	Naval Personnel Research and Development Center
NSC	Naval Supply Center
NSWC	Naval Surface Warfare Center
NIF	Navy Improvement Fund
OT	Overtime
PAT	Performance Action Team
PGS	Productivity Gainsharing
PMAR	Professional Merit and Recognition
PS	Profit Sharing
QMB	Quality Management Board
QOP	Quality Orientation Profile
QSP	Quality Suggestion Program
QWL	Quality of Work Life
RDT&E	Research, Development, Test and Evaluation
ROI	Return of Investment
TQM	Total Quality Management
WG	Wage Grade
WGAT	Work Group Assessment Team
WUA	Work Unit Assignment

## CHAPTER 1: INTRODUCTION

This chapter will provide an overview of how the thesis topic was selected.

### 1.1 Structure of Thesis

To provide a guide for the development of my research methodology, pertinent data were reviewed and integrated it into a Background search (Chapter 2). This consisted of: journal articles, text books, Department of Defense (DoD) and Department of Navy (DoN) policy documents, and initial interviews with appropriate people. This data helped develop an initial general gainsharing model.

The Research Methodology is outlined in Chapter 3. This chapter describes the procedures and instruments that were used to develop a final research product. The first three chapters formed the proposal for this thesis. Chapter 4 (Data) depicts the raw data collected through surveys and interviews and Chapter 5 (Analysis) describes the data reduction. Conclusions are then discussed in Chapter 6.

### 1.2 Selection of Thesis Topic

I accepted a position at the Naval Air Propulsion Center (NAPC) as an Aerospace Engineer in January 1990. The organization has since changed its name to the Naval Air Warfare Center Aircraft Division, Trenton (NAWCADTRN). Before coming to NAWCADTRN, I had successfully completed all course requirements for a Master's Degree in the Management Systems Engineering (MSE) option, which is part of the Industrial and Systems Engineering (ISE) Department, at Virginia Tech. Successful completion of a thesis was the only criterion left to complete my graduate work.

Since NAWCADTRN had a very active Total Quality Management (TQM) program, I saw an opportunity to work with the TQM office on a project viewed as important to the

long-term success of the organization. This project would provide the basis for my thesis effort. Before starting at NAWCADTRN, I met with the TQM Coordinator (00Q), Martin Dell, to discuss possible research areas. We settled on investigating the feasibility of implementing a gainsharing (GS) system at NAWCADTRN and developing a gainsharing model. GS is a system/philosophy where employees share in organizational gains. In other words, employees are rewarded for measured improvements to the organization. Gainsharing will be explained in further detail, in Chapter 2.

After discussions with my thesis committee, I decided to develop a general model for gainsharing, applicable to all organizations, which was based on a review of the literature. This model was to be validated and improved upon and then specific gainsharing issues for a government, Research, Development, Test & Evaluation (RDT&E) facility were identified. It was determined that NAWCADTRN would be used as a case example to define these specific issues. Since NAWCADTRN is slated to close, gainsharing will not become a reality for this organization. My intent is for any government, RDT&E organization to be able to use the specific issues uncovered to develop a gainsharing system for their organization.

### 1.3 NAWCADTRN Exposure to Gainsharing

Top-management at NAWCADTRN became aware of gainsharing success stories in the year prior to the commencement of this thesis effort. They received a one-day training session on Productivity Gainsharing (PGS) and were informed of the many policy changes that had taken place in the DoD and the DoN that could make GS a reality at NAWCADTRN. There were 14 DoD Activities that had implemented some type of a gainsharing system and all had experienced success (savings) with their systems (GAO Study on Gainsharing, 1986). Five of these were still ongoing when the Study came out. The PGS Implementor's Handbook (1990) stated that there were presently 10 operating gainsharing systems in the DoN and 9 in the assessment or development stages. There

were many more activities that were investigating the feasibility of having a GS system operating in their organization.

NAWCADTRN top-management was so enthused about the possibility of implementing a GS system that they incorporated it into their FY89-90 Strategic Business Plan. Goal 1.3 of this plan was:

"By February 1994, employee performance is recognized predominately through a team-incentive scheme."

Investigating PGS falls specifically under Objective 1.3.1, which read:

"00Q will investigate the current Department of Defense 'Gainsharing' regulations to determine applicability to NAPC by 31 December, 1989."

NAWCADTRN management brought a workshop on-Center in March of 1989 to receive an overview of GS and the policies governing it. They were exposed to a DoD accepted process for the design, development, implementation, and evaluation of gainsharing systems. A lot of optimism on the feasibility of implementing these systems was shown by management. In several executive board meetings gainsharing was discussed as something that could help the organization to improve. There were many that felt NAWCADTRN needed to take a more in-depth look at GS, as outlined in Objective 1.3.1. This was the basis of the management support for conducting this thesis effort.

#### 1.4 Need for Gainsharing

In the last 20 years, the productivity improvement of the U.S. has seriously lagged behind that of other industrialized countries (Horn, 1987). The severity of the situation is masked slightly, by the rapid technological advances of the past. These advances occurred with such frequency that the decreasing contribution of the employee went

unnoticed (Grant, 1982). Because of this phenomenon, the U.S. standard of living has risen at a much slower rate than that of other countries. This situation has forced American organizations to re-examine the way they do business and determine where improvements can be made. For improvement to take place, the workers must have the incentive to attempt and push for improvements. There must be an effective means of motivating employees to give them the desire to improve. If employees are to be committed to the long-term success of their company, they must be rewarded when they improve.

In the federal government, there has been a recent trend of budget cuts, especially in the DoD where the federal government has been asking its people to do more with less. For the federal worker to answer this call, they must receive adequate compensation for their work contribution. Presently, there are tremendous pay and incentive inequities for the federal worker (Dulworth & Usilaner, 1987), whose pay lags behind the private-sector by 24%. A pay equity act has been passed in an attempt to close the gap between the federal and the private-sector. This Act provides federal workers pay adjustments of 2.5% per year for about 10 years, starting in 1994 (CP Memo, 1990).

In the near-term (next 3-5 years), there needs to be some changes to improve the federal workers' perceptions of the way they are compensated for doing their jobs. Improved incentives need to be integrated in addition to base pay. Adequate base pay and benefits are an expectation of the workers, whereas salient incentives are more of a desire (Tripathi & Agarwal, 1985). That is why improved incentives are even more vital for government organizations that want to increase their probability of success. It is very easy for the federal worker to be apathetic towards making improvements because of the tremendous bureaucracy involved when trying to change things. GS can be an incentive to help the federal worker overcome this frustration. It can help commit workers to forcing change with the intent of improving their organization.

Teamwork is being stressed more than ever as a necessary element to a successful

organization. People are being asked to cooperate with their fellow workers to get the job done and collaborate with them to improve the work place. In addition to creating a team-oriented culture, successful organizations are attempting to get their employees more involved in decision-making (Dulworth & Usilaner, 1987). Employee Involvement (EI) serves two purposes: 1) attaining employee input for improvement and 2) providing employees with the satisfaction of contributing. Gainsharing provides a mechanism to promote teamwork and to establish EI.

Total Quality Management (TQM) is a new focus in recent years that had its origins with the Navy. Some may say this is a new name for old philosophies that the quality gurus like Deming, Juran, and Crosby have been teaching for years. Even so, this approach to organizational improvement has been very prevalent and successful (HRRC Report on Quality, 1988). The thrust of TQM is basically focusing on continuous process improvements and staying close to your customer (Strickland, 1988). Gainsharing can also provide an incentive to improving performance by rewarding those who practice TQM philosophies.

### 1.5 Benefits of Gainsharing

Gainsharing can motivate people to work harder and smarter, along with creating a better team orientation. For organizations like NAWCADTRN to remain competitive and to thrive in the future, they must constantly reevaluate the way they do business and identify areas for possible improvements. In the future, all government facilities will be asked to do more with less, especially government, RDT&E facilities. They will be required to deliver a larger volume of product, with increased quality, for less money (Dulworth & Usilaner, 1987). In other words, increased productivity is a must for organizational survival. Since GS can be tied to increases in productivity, it can be a direct motivator for workers to do more with less. Both the organization and the employees can be benefactors of GS.

There are hundreds of private organizations that have had successful gainsharing systems, along with many government installations. They have gotten the worker more involved in the work place and have helped to create a more improvement-oriented culture (Hatcher & Ross, 1986). Government, RDT&E organizations need these characteristics to ensure long-term success. GS can act as a catalyst to promote desired organizational characteristics.

Gainsharing is much easier to implement in an organization that preaches and practices the TQM philosophy. TQM lays a lot of the ground-work to better prepare the organization for the transition to GS. Most importantly, TQM creates an improvement awareness and stresses employee involvement. Top-management at NAWCADTRN is very supportive of the TQM effort and supports the use of GS.

#### 1.6 Gainsharing Needs to be Tailored

About 10 years ago, the DoN decided to experiment with an employee involvement/incentive concept called gainsharing that had existed in the private-sector for over 50 years (PGS Implementor's Handbook, 1990). The DoN uses the term Productivity Gain Sharing (PGS) and it has seen increased use since its inception. PGS has expanded throughout the federal government and many agencies have adopted and integrated these systems into their organizational management systems.

There are 3 popular types of gainsharing plans that are being used successfully. These are: Scanlon, Rucker, and IMPROSHARE. Since so many of these plans are in existence, consultants have become very proficient at implementing these plans in organizations in almost a cookbook fashion (Schuster & Miller, 1987). But because organizations are distinct, many organizations need gainsharing plans to be individualized. Many plans have to be tailored to mesh with the organization's specific attributes. More than 42.7% of all gainsharing plans and 58.9% of service organizations from a study by O'Dell (1987) were customized.



NAWCADTRN is an extremely unique organization. For a GS system to be effective in a government, RDT&E facility a lot of specification will be required. There are many rules and regulations NAWCADTRN must adhere to. Many of these will have an impact on a GS system's design. A large portion of NAWCADTRN's workload entails testing military aircraft engines in-house and evaluating the results. The other major portion of the direct workload is aircraft engine Research and Development sponsored activities. Practically all other work done at NAWCADTRN is indirect work performed in support of these two direct functions.

Because workload is organized along programmatic and manpower along functional lines, NAWCADTRN has matrix organization characteristics. Programs are funded and appropriate personnel from throughout the Center are assigned to provide support for it. There is also indirect funding to support non-programmatic related activities, such as public works projects and accounting functions. The work force is comprised of a white-collar/blue-collar mix, which further complicates the gainsharing picture. Given these characteristics (e.g., Federal Government, RDT&E, direct-indirect workload, and white-collar/collar workforce), developing a GS system is a tremendously complex undertaking. All government, RDT&E organizations face similar issues to contend with and operate in much the same manner.

Setting performance measures and devising a formula system to identify dollar savings due to improvement is complex. Because of NAWCADTRN's extremely complicated workload and organizational structure, some believe gainsharing to be impossible. Starting with the basic philosophy of GS, which is rewarding all employees (sharing) for improvements (gains), a system can evolve that will be of benefit to both NAWCADTRN and its employees. The development of a gainsharing model for a government, RDT&E facility is a challenge; but it is I believed to be attainable and will be worth the effort. To develop this model, several research questions must be answered.

## 1.7 Research Questions

In any research effort it is an absolute necessity to have a comprehensive, well-formulated set of research questions to answer. These questions act as a guide for every activity undertaken to meet your research objective (Leedy, 1985).

Based on an initial investigation of the topic and thesis committee input, the following research questions emerged.

- 1) What are the design parameters for gainsharing?
- 2) How do you integrate these parameters into an organization?
- 3) How do you ensure the general gainsharing model is valid?
- 4) How do you specify this model for a government, RDT&E organization?

If an all inclusive job of addressing these questions is conducted, a GS model will evolve that could provide the basis for a valuable and practical addition to many organization's management systems. Parameters are defined to mean the characteristics of the GS system. The next chapter, Background, will address many issues impacting gainsharing and, at the end, will arrive at a general gainsharing model.

## CHAPTER 2: BACKGROUND

The purpose of this chapter is to gather and analyze applicable information to construct a general gainsharing model.

### 2.1 Investigation of Gainsharing

The first step when tasked with the development a gainsharing model is to gain a general working knowledge of the subject. It would be beneficial to examine issues such as: reasons for implementing gainsharing, history of gainsharing, popular gainsharing plans, and how it compares with other incentive systems.

#### 2.1.1 Driving Forces for Using Incentive Systems

All organizations, both public and private, are feeling the threat of increased domestic and foreign competition. These organizations, recognizing the magnitude of the challenge confronting them, have begun to re-evaluate the assumptions underlying their management systems, processes, and practices. Managers are now realizing that the usual ways of managing organizations are not effective in today's environment (Grant, 1982). Declining U.S. productivity is a major concern because of its effect on inflation (GAO Study, 1981). Wages rose at an annual rate of 9 percent in the late 1970s and early 1980s, while productivity growth fell to an abysmal 1 percent. When wages rise without a corresponding growth in output, organizations must raise prices to maintain profit margins. This results in inflation, thus lowering the average standard-of-living for the American public. Statistics in the late 80s have improved slightly, but not nearly enough. The future of our national wealth is in jeopardy if this situation doesn't change.

In the 70s when inflation outstripped productivity growth, firms could react by raising prices. They no longer can do this because of increased competition (Schuster & Miller, 1987). Faced with the increased threat of domestic and international competition,

organizations are looking for ways to improve organizational effectiveness (Debettignies, 1989). One of the successful ways to do this is to redesign and improve incentive systems. Foreign firms are making full use of incentive systems for their workers. For instance, Japanese firms are able to pay semi-annual bonuses based on the market condition which constitutes 10-50% of the worker's paycheck (O'Dell & McAdams, 1986). U.S. firms are not only being forced to compete with foreign products, but also with foreign incentive systems.

A General Accounting Office (GAO) Study, conducted in 1981, examined incentives in both the private- and public-sectors. Some of the major findings were:

- 60% of employees felt the organization did little to change their motivation.
- 40% said current incentive systems make little contribution to their work group's productivity.
- 30% believe increasing their performance would not get them any reward.
- 60% aren't sure awards are presented to the most deserving.

O'Dell (1984) did another study of organizational rewards systems and found:

- The majority of people do not find their reward system rewarding.
- Most employees do not see the relationship between pay and performance.
- Most employees don't feel they benefit from productivity improvement in their organization.

The situation in the public-sector is even worse than in the private-sector. It is becoming more difficult to raise taxes that would enable government agencies to provide an improved level of service. The public-sector is being forced to either cut services or improve productivity to achieve the same level of service with less funding. Improving productivity in the public-sector requires an examination of management systems,

processes, and policies to identify where improvements can be made. Declining resources and increased workloads will remain an operating reality in the foreseeable future (Dulworth & Usilaner, 1987). The Balanced Budget and Emergency Deficit Control Act of 1985 is an example of legislation that is forcing the federal government to cut costs and improve productivity.

Almost all federal government agencies are faced with the familiar problem of declining resources accompanied by increasing workloads. It is becoming increasingly hard to achieve and maintain a high motivational level for the federal worker in these times. The government worker's pay is 24% behind that of the private-sector. The present system of in-grade pay increases and Cost-of-Living Allowances (COLAs) just aren't enough to compensate for this inequity (Dulworth & Usilaner, 1987). Existing formal incentive systems are not effective at tying rewards to improvements in productivity. The average federal government agency spends 1% of their payroll budgets on incentives, while the private sector ranges from 5-15% of payroll. Recognizing this fact makes it even more evident that incentives in the federal government need tremendous improvement. The thrust to improve, combined with wide-spread dissatisfaction with present incentives are forcing organizations to make aggressive strides towards improving their incentive systems. One of the most popular and effective incentive systems in use today is gainsharing.

### 2.1.2 Gainsharing is an Improvement Tool

People/organizations have offered incentives to encourage desired actions for thousands of years. In the last 100 years, many formalized incentive systems have been introduced. Companies are using incentives to: boost productivity and quality, link pay to performance, stress variable pay, and make employees stakeholders in the organization (Ross & Hauck, 1984). Gainsharing helps to accomplish all of these pursuits. Gainsharing focuses on goals like improved: efficiency, quality, service, reliability, and cost control. This helps modify employee behavior, thus better relating pay to

performance (Nickel, 1989).

During the 1960s, interest in gainsharing waned. But, as a result of the erosion in world markets and a recent increased interest in employee Quality of Work Life (QWL), gainsharing experienced a resurgence. The philosophy of gainsharing in its rawest form is that a group of employees can be economically motivated to cooperate and work in unison to raise their individual income and the organization's performance (Schuster & Miller, 1987). Gainsharing is presently one of the most popular and effective incentive systems being utilized by American organizations. The number of firms using gainsharing and small group incentives is predicted to increase by 70% in the near future (Buhl, 1989). One-half of the existing gainsharing systems have been implemented in the past five years. Gainsharing is projected to grow 76% in manufacturing and 168% in service industries in the near future (Boyett, 1987).

The primary objective of gainsharing is to create conditions where both the worker and the organization benefit from improvements in productivity. Employee interests will expand to the entire organization, so they become more interested in operations throughout the organization. Thus, becoming more attentive to eliminating impediments to organizational productivity. Gainsharing programs involve employees in improving productivity through the better use of: labor, energy, and capital (Boyett, 1987). Gainsharing is normally based on productivity, not profit. It's focus tends to be on the organization, teamwork, and distributing organization shares (Ringham, 1986). For gainsharing to be successful, employees need to have a strong identity with the organization. This is gained through employee involvement and a commitment to communications.

Ross (1984) outlines benefits of gainsharing to both the company and the employees.

Company benefits:

- 1) increased organizational flexibility

- 2) improved communications and cooperation
- 3) ideas and efforts are produced
- 4) improved planning and control systems
- 5) employee identity with organization history, goals, and opportunities
- 6) increased problem identification and solving
- 7) increased employee involvement
- 8) increased competitive posture
- 9) climate of efficiency, quality, and competency
- 10) better labor relations

Employee benefits:

- 1) increased recognition
- 2) share in productivity increased
- 3) more security
- 4) improved communications
- 5) understand better how to "get things done"
- 6) feeling of contribution to the organization
- 7) chance to get more involved
- 8) opportunity to learn more about the company
- 9) better relations with employees and management

### 2.1.3 Gainsharing Studies

Markham (1992) conducted a random sample of 10,000 human resources managers that are members of the Society for Human Resource Management. Over thirteen percent of the respondents had active plans. The Machinery/Equipment and Manufacturing industries had the most frequent use of gainsharing and the Financial and Government areas had the least. Custom plans were the most popular type of plan. Seventy-seven percent of respondents had heard of gainsharing. The average total bonus paid in these plans was approximately 7.55% of total payroll. An average of six months passed before

the first bonus was issued and bonuses were distributed about 70% of the time. The average satisfaction with the plan was 3.55 on a scale from 1-5.

Bullock & Lawler (1984) conducted a study of active gainsharing plans. They looked at structural, implementation, and situational factors. Structurally, plans used a lot of involvement, had productivity as their main measure, and focused strongly on labor. Implementation also used employee involvement and over two-thirds used an outside consultant. Situational factors show two-thirds of the plans were in union organizations and almost all were in manufacturing. The outcomes of the gainsharing plans studied increased: organizational effectiveness, QWL, innovation, and labor management cooperation. Two-thirds of plans were considered to be successful and almost all distributed bonuses. They identified some important factors contributing to a plan's success, which are: the local labor and product market environments, employee participation, and managerial competence. They also found that gainsharing can either lead or lag an overall organizational intervention. Lawler (1985) found that the success rate of gainsharing plans is about 70%. He determined that gainsharing plans create social pressures to increase performance and create goals for the organization to follow.

Scott & Zatsick (1987) assessed the benefits of many private-sector gainsharing plans. This assessment was done in support of a gainsharing study sponsored by the transit industry. They identified benefits such as: improvements in productivity of 10-20%, information sharing, teamwork, more commitment, and better management relations. Schuster & Miller (1987) examined companies that successfully implemented gainsharing. These plans yielded an 8-15% productivity increase each year.

Dulworth (1985) looked at several studies, which showed the benefits of GS. He concluded from these studies that if gainsharing is correctly designed, implemented, and operated it can be an effective mechanism for fostering productivity improvements. A survey conducted by the Harris consulting company of manufacturing executives showed that almost all supported awarding bonuses dependent on the company's success.



Hatcher & Ross (1986) found that 74% of the firms with gainsharing plans labeled them a success, and only 2% labeled them as unsuccessful.

O'Dell & McAdams (1986) did a study of gainsharing demographics. The average size firm was 5222 employees with a median of 966, indicating a high number of small firms with gainsharing. Those with facility gainsharing, which is normally a plant within a larger company, had an average of 387 employees and a median of 954. Some of the major reasons cited in this study for gainsharing implementation are:

- productivity improvement
- quality improvement
- better employee relations
- reduced labor costs
- create pay-for-performance
- competitive pressures
- instill a corporate philosophy shift

Buhl (1989) found that gainsharing bonus pay as a percent of base pay is between 7-10 percent. Over half of the firms using gainsharing pay bonuses monthly. Hatcher & Ross (1986) did a survey of 108 managers in organizations with gainsharing. All of these organizations were production firms employing between 100-450 people. The survey studied managers' adjustment to gainsharing, evaluation of subordinates performance, and satisfaction with their gainsharing plans. They found that all three areas showed improvement as result of their gainsharing experience.

O'Dell and McAdams (1986) evaluated the impact of Scanlon, IMPROSHARE, profit-sharing, and custom gainsharing plans in 10 areas. The percentage of 89 companies with custom plans reporting "positive" or "very positive" results in the 10 assessment areas are listed below. These are good areas to measure a plan's effectiveness.

1) productivity	93%
2) employee involvement	77%
3) communications	77%
4) quality	76%
5) costs	73%
6) employee pay	72%
7) labor relations	68%
8) scrap and rework	48%
9) turnover	41%
10) work rules	25%

White (1979) reviewed gainsharing literature to determine causes/correlates of program success. He found these successes could be organized into nine attributes:

- |                         |                           |
|-------------------------|---------------------------|
| 1) values               | 6) bonus                  |
| 2) management practices | 7) top-management support |
| 3) employee involvement | 8) organizational traits  |
| 4) measurement          | 9) workforce              |
| 5) information sharing  |                           |

In an investigation by Rossler (1991), he defined the six components of a gainsharing system for a manufacturing organization as being:

- 1) production
- 2) financial performance
- 3) compensation
- 4) participation
- 5) information sharing
- 6) incentive bonus

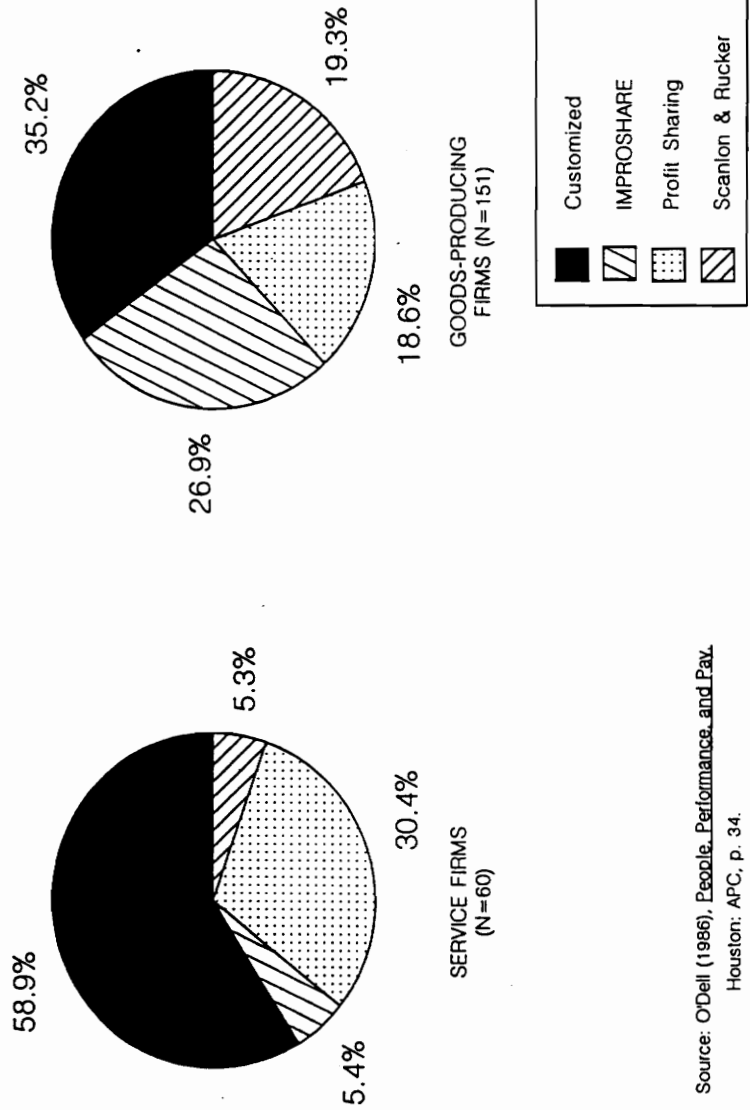
The categories/components discussed above are a building block for the list of design parameters which will be identified later in this chapter.

An increasingly popular technique for combining the results of several studies is called meta-analysis. This is a quantitative approach to the integration of findings from different studies (Peter, 1986). It is a statistical summary of all findings and seeks to explain variation of findings across studies. Meta-analysis treats the findings of individual studies as endogenous (dependent) variables and examines them as a function of one or more exogenous (independent) variables. A meta-analysis can be performed to combine the methods and results from different studies into one overall assessment (Farley, 1986). Unfortunately, my literature search is made up almost entirely from descriptive articles with qualitative findings, and not experiments with controlled independent and dependent variables and analysis of variance performed. Thus, this analysis will not be exercised in this thesis.

#### 2.1.4 Different Types of Gainsharing Systems are Used

Every organization is different and has individual needs when it comes to applying an incentive system. No gainsharing systems are exactly alike, but there are several major types of systems. These types are: Scanlon, Rucker, IMPROSHARE, and Custom plans, which will be explained below. An O'Dell & McAdams (1986) study found that of companies using gainsharing, 15% use Scanlon, 21% use IMPROSHARE, 21% use profit sharing, and 43% use a custom plan. They considered profit-sharing to be a type of gainsharing plan in this study. More than half of the service-sector firms were customized, but they only made up one-third of the gainsharing firms (see Figure 2.1 on the following page). The American Productivity Center (APC) did a large study of organizations, employing over 10% of the U.S. workforce. They found that 14% of U.S. organizations used gainsharing. Half of these used custom plans and one-quarter were service companies.

## TYPES OF GAIN SHARING PROGRAMS BY INDUSTRY



Source: O'Dell (1986), *People, Performance, and Pay*.  
Houston: APC, p. 34.

Figure 2.1. Types of Gainsharing Programs by Industry

The 4 major plans are explained in the following sections. Most of the descriptions are taken from Schuster & Miller (1987) and Owens (1988).

#### 2.1.4.1 Scanlon Plan

This plan was developed by Joseph Scanlon, a local union president, to save his company from bankruptcy. It functions by soliciting suggestions from employees on how to: increase productivity, eliminate waste, and reduce production costs. Improvements are measured by means of a base measure or standard, which in this case is a ratio of labor costs to total sales (with adjustments for inventory changes). Any improvements, as measured by this ratio, will determine the bonus pool to be shared. The ratio can be modified slightly and can be applied solely to a specific organizational unit to suit your organizations needs. The savings are split between the employees and the organization and a percentage of the employee share is normally placed in a reserve pool. The reserve pool is used to cover for any quarters where there is negative improvement.

An important component of the Scanlon Plan is the committee system. This system operates by means of a series of production committees and a screening committee. The production committees are normally configured along organizational lines consisting of representatives from throughout the organization. The number of production committees will vary depending on the size of your organization. These committees meet periodically to discuss employee suggestions and forward them to the Screening Committee. The Screening Committee is made up of management and non-management employees. It has 2 basic functions: 1) to accept and authorize suggestions submitted by a production committee and 2) calculate the bonus. Some organizations authorize production committees to implement minor suggestions without Screening Committee approval.

#### 2.1.4.2 Rucker Plan

The Rucker plan was developed by Alan Rucker, an economist, who studied many volumes of industrial statistics. Based on his observations, he developed a measure called the "value-added index." This index is the ratio of payroll to the value-added quantity, which is the sales value of finished goods minus the costs of raw materials, supplies, and services. A standard for the value-added index is calculated over a period of time to assess improvement. The objective of the Rucker plan is to reduce the Value-Added index, where savings are then realized and payouts can be made.

The savings are split between the company, the employees, and a reserve pool. The reserve pool is used to offset losses when productivity falls below the standard, just like with the Scanlon Plan. The Rucker plan also seeks to solicit suggestions from the employees to improve company productivity. There are production committees that meet to discuss suggestions and an operating committee that authorizes implementation of all suggestions. There is a screening committee, consisting of top-management, that oversees the program. The main difference between the Scanlon and the Rucker plans is the measure.

#### 2.1.4.3 IMPROSHARE

This plan was developed by Mitchell Fein, a consulting industrial engineer. IMPROSHARE uses a labor-hours ratio for the bonus calculation. A standard number of labor hours to manufacture each of the company's product or part of the product is determined by measuring past performance. This base standard is updated when needed, through a "buy-back," explained below. When the organization realizes an improvement in labor hours per product, each individual receives a bonus based on either their hours worked or gross pay.

Most productivity gains are split 50-50 between the company and the employees, except when gains are the result of some major capital investment. Ceilings are placed on productivity gains to avoid extreme variations in bonuses. Excess bonus money is

"banked" for use when employee bonuses are below a predetermined bonus ceiling. This is similar to the Reserve Pool in the previous two plans. When the standard needs to be increased because of a consistent higher level of productivity, the company will "buy-back" the standard increase from the employees. For example, if the company needs to raise the standard by 20%, the employees will receive a one-time bonus equal to the 20% increase over a year's time. One year is felt to be a fair buy-back period. IMPROSHARE uses a labor-management committee to remove impediments to improvement and ensure a cooperative work atmosphere. Most plans do not have formal employee participation systems.

#### 2.1.4.4 Custom Plans

It was evident in the O'Dell & McAdams (1986) study that custom plans are becoming increasingly popular. In many cases, these plans use characteristics from all the above plans and tailor certain attributes to fit their organization's incentive needs. The major attributes usually tailored are:

- 1) calculation of bonus
- 2) program coordinator functions
- 3) committee membership and employee involvement
- 4) methods for evaluating ideas

Rosler (1991) identified six organizational components that will impact the design of a gainsharing system. These components, which need to be customized for each organization, are:

- 1) production
- 2) financial performance
- 3) compensation
- 4) participation

- 5) information sharing
- 6) incentive bonus

## 2.2 Gainsharing in the DoN

The Department of the Navy (DoN) has been extremely active in the development and implementation of gainsharing systems. The Navy commonly uses the term "Productivity Gainsharing" (PGS) as an accepted term. There are many policies regulating GS/PGS and several studies that were conducted which need to be acknowledged and understood to conduct a viable PGS investigation. The Total Quality Management (TQM) initiative of the DoN is important to understand, along with other DoN incentives to get a feel for how GS fits into the DoN's improvement and incentive practices.

### 2.2.1 The Advent and Development of Gainsharing in the DoN

The Department of Defense (DoD) is the most actively involved in gainsharing within the public-sector, with the DoN leading the way (Scott, 1987). The DoD Guide for the Design & Implementation of Productivity Gainsharing Programs (1985) outlines the definition of PGS as follows:

"A group-based incentive and involvement system designed to maximize the total performance of resources for mission accomplishment through sharing the gains from proven improvements in productivity with the employees, the activity, and the customer per a predetermined formula."

Some of the precipitating factors of GS were the Grahmm Rudman Hollins Act and the Navy Industrial Improvement Program. Both of these thrusts were focused on cutting costs, while maintaining the same level of service. It was realized by Navy top-management that gainsharing had this same philosophy and could be an excellent tool in reacting to mounting external pressures. Many instructions and studies came out of Navy



top-management "selling" GS as an excellent improvement tool. Goal #3 of the DoN Total Performance Improvement Plan (1988) reads as follows:

"Improve incentives and recognition methods, including PGS, to promote involvement in the performance improvement process."

The DoN's Policy on PGS (1988) dictates that gainsharing is most successful when applied activity-wide on a long-term basis as part of an overall improvement plan. This requires cultural change and open communications. The DoN supports using GS to improve performance for better mission accomplishment. The Commanding Officer (CO) of the activity is given maximum flexibility to specifically tailor the GS plan to meet the unique needs of their organization. The plan must be implemented in addition to the existing incentive and performance appraisal procedures. The plan can be based on competitive conditions or productivity improvements. The payouts should include contingency mechanisms based on: quality, schedule, and financial results and must be made from funds saved using available Navy Industrial Fund (NIF) or Operation and Maintenance funds. The GS plan must also satisfy local labor agreements.

The Assistant Secretary of the Navy for Shipbuilding and Logistics (ASN/S&L) is responsible for PGS policy. The Comptroller of the Navy is in charge of financial policy and the Office of Personnel Management (OPM) is responsible for the personnel policy regarding GS. The second echelon commander (a level above the activity) is responsible for plan's approval and for ensuring that all relevant policies are abided by.

Activities can use GS as a framework for motivating employees to improve productivity. As dictated by the DON's PGS Implementation Requirements Instruction (1988), the plan must provide the opportunity for employee representatives to participate in all phases of development. The plan should also utilize performance measures with standards to ensure that the plan's objectives are being met. It should outline all surrounding design issues like: measurement, bonus calculation, and idea handling. This plan should also

outline the cultural changes that must take place for GS to become a reality.

The former Director of Industrial & Facility Management for the Naval Sea Systems Command (NAVSEA-07), Rear Admiral Horne, is a strong advocate for gainsharing use in the Navy. He stated that GS is one method to change the way we do business, necessary to meet productivity improvement needs. Admiral Horne also made the following comments pertaining to PGS.

- 1) Savings should be measured in real dollars and be documented by an appropriate plan.
- 2) Plans should measure or be consistent with financial performance of the total activity.
- 3) MTP (Manage to Payroll) is not foreseen as a major problem, gainsharing payments are considered a cost of doing business.

There are 11 Navy activities presently using gainsharing, with many others in the assessment or development stage. GS is an integral part of the Navy's TQM movement (to be explained in section 2.2.2), of which incentives play a major role. Other improvement themes to be integrated with GS are: training, quality focus, capital investments, and employee involvement (PGS Implementors Handbook, 1990). In a briefing to the Congressional Subcommittee for Appropriations on the subject of gainsharing in the DoD, the following trends were found: use of organization-wide measures, extensive employee involvement, and almost all plans have been successful. By focusing attention on performance, GS efforts helped resolve organizational problems, inadequate management controls, and impediments to productivity improvements.

A Productivity Gain Sharing Assessment Study (1987) was conducted by the PGS-High-Performance Action Team (HPAT), which was formed by selecting one representative from each Naval Aviation Depot (NADEP). NADEPs are industrial facilities responsible for repairing all Navy aircraft. The HPAT uncovered several pros and cons for using

GS in the NADEPs. The cons were substantial time and training were required. Gainsharing is not a cure-all and shouldn't be viewed as an organization's solution to all their problems. Some of the pros were that the majority of plans generated:

- "real" savings
- improved labor-management relations
- less grievances
- less absenteeism
- less turnover
- less work backlog
- increased sharing of knowledge
- greater acceptance of change
- improved job satisfaction
- better adherence to schedule

A General Accounting Office (GAO) Study (1981) stated that OPM guidance for GS needs to be improved. They found that GS has a positive effect on productivity and existing special act and sustained superior performance awards aren't congruent with these productivity based rewards. Because of this, some agencies have used the money designated for these two incentive systems to supplement their systems. In fact, the HPAT declared that other incentive systems can be used as "seed" money for GS.

The Department of the Navy's Productivity Improvement Program sponsors investments that will result in improved performance. Savings that accrue from any resulting productivity gains will be reapplied to the organization. The DoN also supported rewards for improved productivity in resource and workload allocation decisions (SECNAVINST 5200.31B). Both of these initiatives provide direct support for gainsharing.

### 2.2.2 Total Quality Management in the DoN

The productivity "scene" has recently targeted the public-sector, saying it can and must deliver a better product or service at less cost. Public-sector organizations are those which perform the duties required for the health and welfare of the general population. In the past, employees have chosen careers in this realm for better: job security, equal opportunity, grievance process, and retirement (Nordstrom, 1988). TQM is the newest initiative effecting many of these public-sector employees.

The DoN has been a leader in the field of TQM. The Department of Defense's Posture on Quality (1990) gives top priority to the DoD Total Quality Management (TQM) effort as a vehicle for attaining continuous quality improvement in its operations. This will require a fundamental change on how the acquisition community views product quality. It is becoming every program manager's responsibility to ensure that TQM is utilized in every step of the acquisition process. Strickland (1988) states how the DoD is using the Industrial Modernization Program to assist defense contractors in increasing their capital base and the Acquisition Streamlining Program to cut the cost and time of weapon system acquisition. Both of these efforts resulted from the TQM "push."

The rules and procedures for winning in-house contracts using a Most Efficient Organization (MEO) Study operated through efficiency reviews is explained in the Navy Performance Improvement Plan. MEO procedures were set up to open up functions at all DoD agencies for bid by private contractors. This opens many business opportunities for the private-sector, while increasing government efficiency through increased competition.

### 2.2.3 Other Incentive in the DoN

To better understand how PGS will fit into an organization, other incentives should be investigated. There are several monetary incentive awards that are offered to federal employees (NAVAIRINST 5305.1C). A description of the incentives available to DoN employees are listed below:

- 1) Sustained Superior Performance: An individual monetary award, given at the end of the fiscal year and normally relates to the person's salary.
- 2) Special Act: This is a cash bonus given to either an individual or group to recognize exemplary performance as a one-time occurrence.
- 3) Suggestion Award: A cash bonus, given either to a group or individual for a suggestion that increases the efficiency and effectiveness of government operations.
- 4) Quality Increase: A within-grade salary increase given to individuals for sustained high performance in their job.
- 5) Honor Awards: Recognizes distinguished career or mission oriented achievements in the form of a plaque or other non-monetary form.

All of these awards are first recommended by the individual or group's immediate supervisor and then approved by the appropriate body. The first three awards come out of an incentive pot, which totals one percent of the total payroll. The Quality Increase is accomplished through a simple payroll modification and the Honor Awards are non-monetary recognition.

The Federal Personnel Manual (FPM 451.6) dictates the effective use of monetary and non-monetary recognition. It states that all employees whose performance exceeds the standards for the position concerned should be considered for the appropriate monetary recognition. Effective use of monetary recognition is defined as: granting solely on merit, in the appropriate form, in a prompt manner, equitably throughout the organization, and ensuring credibility by issuing awards in a public manner. There are two major non-monetary, honorary recognition awards spelled out in the FPM. These are distinguished career-oriented achievement and significant achievements in specific professional areas. There are several privileges that may also be issued to deserving employees: job enlargement, educational opportunities, and career development. The FPM states that in the past, honorary recognition was synonymous with non-monetary recognition. However, there is nothing to preclude using honorary awards in addition

to monetary awards or using monetary awards in an honorary manner.

There has been some recent developments in the federal government compensation system. In 1990, President Bush signed into law a bill called the General Schedule Pay Reform. Beginning in 1994, salaries were to be based on the national Employment Cost Index (ECI) for all positions (NAPC/CPD Memo, 1990). There will also be adjustments based on the differences between federal and non-federal employees in your local area. This reform will help remove some base pay inequities compared with the private-sector. However, this legislation will not address any inequities with incentives.

### 2.3 Gainsharing Case Examples

Many organizations in both the private- and public-sectors have successful gainsharing systems. There are many lessons to be gained from their experiences. Case examples will provide a sense for how organizations are designing their gainsharing systems and their rate of success. These examples will help formulate initial views with regard to the research questions. Private-sector organizations will be examined followed by the public-sector. A brief description of each organization's gainsharing plan characteristics will be outlined for each case example. At the end of this section, all the Navy and private-sector gainsharing cases will be compared to the first two research questions.

#### 2.3.1 Private-Sector Gainsharing Systems

Information was located on 13 gainsharing systems in the private-sector. The systems were sequenced based on amount of information found for each. At the end of the section there is a listing of additional organizations that have implemented GS.

##### 2.3.1.1 McDonnell Douglas Electronics Company; St. Louis, MO

The objective statement for their gainsharing system was: implement a system that

provides security, profitability, customer satisfaction, and employee incentives through the trust and involvement of all employees. McDonnell Douglas Electric Company (MDEC) created design teams from 9 areas throughout the company and had a steering committee to oversee the design teams. Their bonus calculations were based on a return-on-investment (ROI) measure. The total savings were split 60-40 (company-employees) and all employees received a payout based on the hours they worked. They did not use any type of a reserve pool. They approved 20-40% of the suggestions that were submitted.

MDEC had a "shared fate" philosophy, which is why they use ROI as their measure of success. The bonus calculations were made on a quarterly basis using the previous 36 month figures as their performance standard. They didn't use the 36 month moving average, until they were involved with their gainsharing system for 3 years, though. They believe their basic pay system rewards individual achievement and gainsharing will reward group achievement. Typical quarterly payouts were about \$200 per employee.

A draft plan was submitted to the employees for comments and then the final plan was voted on (70% approved). A plan administrator was in charge of gainsharing implementation. MDEC emphasized heavy training at all levels to ensure the plan's success and an idea handling system was instituted to promote EI. Each work area created a charter outlining specifically how their idea handling would work.

#### 2.3.1.2 Eggers Industries; Two Rivers, WI

Eggers originally had an individual incentive system, where if you exceeded a standard production rate you received a bonus. It was basically a piece-work system. Only 45% of the employees were receiving bonuses under this system. To improve incentives, a new Employee Involvement Program (EIP) was introduced to the employees. The employees voted on this new EIP, and 70% were in favor of it. Their EIP operated like a suggestion system, consisting of 7 production unit teams to promote suggestions and

a screening council to approve them. They used a two-year trial period to assess the EIP effectiveness and conducted many team training seminars.

Eggers used a profit margin of 18.5% as their base performance standard, any margin above this would result in a bonus. Each production unit had bi-weekly meetings with their managers to discuss performance improvement and payout issues. No salaried employee received a payout larger than the payout of the largest wage employee. The gains were split 55-45 (Eggers-employees) with 20% of the employee's share going into a reserve pool. The remaining money in the reserve pool was given back to the employees at the end of the year. Their initial reward philosophy was that with participative management you have to give the reward first, then ask for improved performance later. In their two year trial period they paid 18 out of 24 possible monthly payout periods. Average payouts increased from \$1404 the first year, to \$1902 the second, to \$3293 the third. The payouts were made on a percentage of wages basis. Ninety percent of workers voted to make EIP permanent at the end of the two-year trial period.

#### 2.3.1.3 Volvo; Kalmar, Sweden

Their plan is based on three principles: identity, participation, and equity. The plant was organized into profit-centers for identity and the employees into work teams to promote participation (1800 employees were on 125 teams). The plan was originally started just for the blue-collar employees, it then expanded to all employees. The savings were split 25-75 (company-employees) and the employees ended up receiving bonuses totaling about 10 percent of their base pay. Their philosophy was to reward the employees for all productivity improvements, both labor and capital (shared fate).

There were several performance standards that had to be exceeded before payouts could be made. These standards are listed below.



- 1) quality index (random sample on 3% of the cars)
- 2) spoilage and adjustments
- 3) materials and supplies used
- 4) added materials used (in excess of planned)
- 5) direct vs. indirect production man-hours per car
- 6) capital costs for inventory and others

The employees were asked to what degree they accepted the plan and felt the standards were in their control. The responses indicated that only 35% of the employees haven't yet accepted the broad-based equal share system and most felt they had some control over the six standards.

#### 2.3.1.4 American Valve; Manhasset, NY

They sold their gainsharing plan as a "no cost" plan for both the corporation and the employees. If no improvements were found, then no payments would be made, thus no losses. They had a 9 month trial period in which bonuses totalled 5% of employees' salary and 90% voted to continue with the plan. In a few years (1975 to 1986), sales increased 37.5% and turnover rates dropped from 120% to 2% annually.

The initial gainsharing plan had a Scanlon, value-added focus with 75% going to the employees. Then they changed to a total cost savings focus, which was the ratio of the sales value of production to total production costs. The formula standard was based on exceeding a profit-margin of 13%. The dollar value of profit-margin surplus would be used for gainsharing. This pool was split 68-32 (employee-company). One-quarter of the employee share was deposited into a reserve pool. Payouts were made on a monthly basis by separate check. The EI system operates by means of 15 production committees, having 3 members each. Two members are elected by the workers and one is selected by management. A Screening Committee oversees the EI system. All committees meet once a month. Performance feedback against goals was updated monthly and distributed

in a year-end report to all employees.

There were marked financial gains by American Valve resulting from gainsharing: production was up, scrap down, and man-hours per product down. Bonuses averaged about 4% of base pay. The plan saw a lot of big short-term gains, but after 3 years no payouts were made and the plan fizzled.

#### 2.3.1.5 Herman Miller, Inc; Zeeland, MI

Herman Miller is a manufacturing and showroom company. Their sole incentive system used to be a piece-rate system. Then in 1950, they switched to a Scanlon Plan, where bonuses were averaging about 10% of base pay. Each month they had a Scanlon Day where the employees were appraised on the results of: customer, quality, performance indices, absenteeism, field problems, orders and backlog, production goals, and the outstanding suggestion of the month. They had 23 department committees and a screening committee to facilitate their EI. They averaged .85 suggestions per employee per year.

A major problem that developed was at the start of the plan, 25% of employees were in non-production jobs, today it has risen to 53%. The measures needed to change to reflect this. They modified the existing system with a program entitled "Scanlon 79." Herman Miller formed 3 sub-committees to design the new plan, which were: Education and Communication, Rules and Regulations, and Equity.

It was determined that they would measure 4 areas: effective use of labor, materials, and money, along with customer service. A bonus wouldn't be earned without exceeding goals in these four areas. The EI system now consists of work teams, where 30-40 members plan for productivity increases. They also have a "representative structure" to handle improvement suggestions. There are now four performance dimensions that are measured in each division, which could impact bonuses either positively or negatively.

In addition to gainsharing, employees can receive performance objective and cost reduction bonuses, which are added right on to their gainsharing bonuses. The bonuses are now averaging about 15% of base pay. A "secret ballot" was distributed to determine the support for the Scanlon Plan. The results were very positive, showing great acceptance for the plan.

#### 2.3.1.6 Morse-Borg Warner; Kansas City, MO

Their gainsharing plan is a combination of a Scanlon committee structure with a Rucker bonus formula. The objectives of their plan were: greater employee involvement and the sharing of increased profits. Their only performance measure, which dictates their bonus, is payroll as a percentage of sales. One-third of the bonus is put into a reserve pool. Morse-Borg Warner has 16 Departmental Production Committees and one Screening Committee, along with a Recommendation Committee. This committee system is the "heart" of their employee involvement. There is a monthly newsletter, distributed to keep the employees informed. They use five indicators to monitor the program's success, which are: grievances and labor relations, turnover, absenteeism, productivity index, and the bonus. The bonus averaged 5.3% of the employee's salary.

#### 2.3.1.7 Butler Manufacturing; Leisburg, NC

The objectives of their plan were to improve: productivity, quality, costs, customer service, and Employee Involvement (EI).

The four components of their plan that Butler focused on were:

- 1) plant productivity
- 2) office productivity
- 3) scrap
- 4) claims

They originally had a merit plan that began to be viewed as counter-productive. The management at Butler decided to replace this plan with a gainsharing system. They had educational meetings with each organizational work group to expose them to gainsharing principles. There was an assessment survey conducted to determine readiness for gainsharing, where it was determined that the employees would accept the plan. The EI system that developed required that work groups partake in problem solving for their area and supply suggestions to the screening committee for action. The suggestions fell into five categories: labor, overhead, material, product improvement, and QWL. Each work group had an area coordinator, who was the point of contact for suggestions. The employees received 60% of the dollars saved (40% to Butler), with one-third of that going into a reserve pool.

In 17 months, \$1,500 per worker was paid out. A 22% increase in productivity has been realized and managers are spending less time on individual employee problems. The self-managing work teams are now addressing these issues. Suggestions were accepted at a rate of 79%. Sales increased as a result of the plan, along with profits. After several years, attitude surveys were distributed and these indicated 98% wanted the plan to continue.

#### 2.3.1.8 Nucor Corporation; Darlington, SC

Their gainsharing system was designed around the performance of its work groups. They rewarded based on man-hours per ton, which is an IMPROSHARE based measure. The department heads are rewarded based on company profit and the indirect workers' incentives are based on the company's Return on Assets (ROA). The employees have total visibility over all the performance measures used in bonus calculations. Nucor's top officers are paid 70% of the market value for similar positions in other companies, the rest of their compensation is earned based on company earnings. The company puts aside 10% of their pre-tax earnings and employees receive 15% of these earnings for gainsharing distribution, the other 85% is set aside for employee retirement. This is

based on the total wages earned throughout their career. They also make extraordinary bonus payments, which they distribute equally to all employees, when profits are up.

#### 2.3.1.9 Sherwin-Williams Co; Cleveland, OH

They have Pay-for-Knowledge and a gainsharing system. They have a Scanlon plan that operates based on cost reductions, which is driven by a suggestion system. Bonus payouts have a cap of 15% of the employee's salary. Everyone at Sherwin-Williams received SPC training to increase each employee's improvement awareness. Many improvements occurred, which resulted in cost savings and in larger gainsharing bonuses for the employees.

#### 2.3.1.10 Crown Zellerbach; San Francisco, CA

They have a pay-for-productions scheme, similar to IMPROSHARE, replacing the old hourly wage system at six of their plants. They hired their loggers as "contractors." The first year of implementation the employees received 13% bonus checks. The second year the employees received bonuses of 6%. Then the plan faded, due to increased market pressures. A few years into the program some employees had to be laid off, due to no fault of the employees. A major positive impact of gainsharing was that the employees stated the blow was softened because informed employees saw it coming as a result of increased information-sharing.

#### 2.3.1.11 Columbus Auto Parts; Columbus, OH

They had problems with their piece-rate incentive system and were experiencing many layoffs. So, the company switched to a gainsharing system, where the formula was the ratio of direct to indirect labor costs. All workers were considered part of a work group and were measured and rewarded at this level. The gainsharing system was managed by three committees: department, labor-management, and an executive committee. They

also had a gainsharing newsletter, which was distributed quarterly with the payouts.

Columbus Auto had the same situation as Crown Zellerbach did with their gainsharing system. They enjoyed early payouts, but then they dwindled. Workers did express the feeling that they would of gone under without the gainsharing and EI. Because of the Scanlon Plan, the employees knew why the bonuses were not there. Fairchild-Burns also had the same phenomenon, along with TRW. Because of the increased communications, employees were aware of the problems in advance and seem to work extra hard to combat this and help to minimize corporate losses.

#### 2.3.1.12 Midland-Ross; Livingston, NJ

They base their gainsharing on an "allowed payroll." The allowed payroll is a performance standard and when payroll comes under this standard, savings are recognized. All of this money goes to the employees and 25% goes into a reserve pool. Midland-Ross distributes monthly. There is a series of production committees to develop improvement suggestions, along with a Steering Committee to approve and help implement suggestions.

#### 2.3.1.13 Jamesbury Valve; Worchester, MA

To coordinate their plan, they have a 40 member Rucker committee, which meets every 3 weeks. This committee discusses financial matters pertaining to the bonus at one meeting and the next is for discussion of suggestions. The adoption rate of ideas is 75% and they have annual gainsharing bonuses of 8-9%. It only cost them \$50K to implement their Rucker plan and are experiencing a fair amount of success with the plan.

#### 2.3.1.14 Other Private-Sector Cases

Hatcher & Ross (1986) compiled a list of forty corporations utilizing some type of

gainsharing plan. These are listed below:

Allied Corporation	Mead Paper
Armoco Steel	Minnesota Mining
Bell and Howell	Motorola
Borg Warner	N L Industries
Dana Corporation	Owens-Illinois
Desoto, Inc.	Parker Pen Company
Firestone	Phillips Petroleum
Gast Manufacturing	Presto-Lite
General Electric	Raymark, Inc.
Goodyear	Rockwell International
Honeywell	TRW
Ingersoll Rand	Teledyne
International Steel	Universal Cyclops
Johnson & Johnson	Weyerhaeuser
Lincoln Electric	Xerox
M. H. Robertson	

### 2.3.2 Navy Gainsharing Experiences

It was difficult to locate any detailed descriptions of public-sector gainsharing systems other than Navy examples and one Air Force facility. Since the Navy appears to be a leader in the field of GS implementation, it is probably sufficient to examine primarily Navy examples. All of the Navy cases use the term "Productivity Gainsharing" (PGS), so this term will be used in this section. I will examine ten major activities that had a good deal of PGS experience. All of the following descriptions of PGS systems were either taken from their PGS plan or from their PGS progress reports, both of which were taken from the PGS Implementor's Handbook (1990).

### 2.3.2.1 Naval Regional Data Automation Center (NARDAC); Norfolk, VA

NARDAC Norfolk was one of 21 sites identified for gainsharing exploration by the Navy. The Naval Personnel Research & Development Center (NPRDC) conducted a productivity gainsharing readiness assessment in September, 1987 and felt that the NARDAC wasn't ready at that point. Previously, they had adopted an unsuccessful Quality Circles (QCs) program. After the NARDAC made some organizational changes and NPRDC, now felt that they were ready for PGS. It was decided that there would be a 3-year pilot period. They had a design team consisting of representatives from the entire Center, headed by a PGS coordinator. They also had a Steering Committee to oversee all PGS activities. The Design Team transitioned into the role of the PGS Implementation Team.

The NARDAC decided that all PGS Awards (PGSAs) will be distributed equally and military personnel will receive comparable leave. A 50/50 split was to be used between the NARDAC and the employees, where twenty-five percent of the Employees' Share will go into a Reserve Pool to help compensate the organization when there are losses. At the year's end, the remaining reserve money will be distributed in the final PGSAs. There was also a Customer Satisfaction Survey (CSS) fund, which constitutes 10% of the Employee Share. The other major measure used is Target Productivity Gain, which must be met before payouts can be made. Depending on the CSS score and if the productivity target is met, a portion of the CSS fund will be distributed.

Money not distributed because of the CSS results will be invested into areas identified in the survey as needing improvement. Leftover CSS funds at the end of the year will be committed to the training budget and carried over to the next year. If it is determined that there is too much money leftover, a percentage will go to NARDAC. Beneficial Suggestion Awards will be deducted from the PGS pool, because they don't want to pay twice for the same improvement. The NARDAC uses a 1-year moving average as their baseline. They also have each department set productivity and customer satisfaction



goals and report on these, but these factors don't enter into the payout formula. They have a Quality Management Board (QMB) structure with ad-hoc Performance Action Teams (PATs) constituting their EI system. The QMBs are built around the organizational structure and are on-going. Whereas the PATs are created to solve specific problems, then are disbanded. There are technical advisors assigned that will assist in solving problems.

Their payouts are based on the ratio of revenues to costs (similar to a profit-margin). They measured productivity within each department and attempted to measure the four functional areas they identified to be their service areas, which are: 1) data processing installation, 2) software applications, 3) technical services, and 4) resource management. There are bonus modifications based on: quality, timeliness, and customer satisfaction indices for each of the four functional areas. It was felt that they could exclude some costs from their calculation, if they were uncontrollable and non-recurring. This was so that employees wouldn't be penalized for costs that weren't their fault. They also measured technical services like training and resource management.

#### 2.3.2.2 Naval Supply Center (NSC); Oakland, CA

Their first step was to assess feasibility by conducting interviews to identify the problem areas to overcome, before PGS would be viable. There was a lot of concern about low performers receiving as much as the higher performers. To help resolve this concern, management agreed that marginal performers would not receive PGS checks, as measured by their formal performance appraisal. The consensus was that indirect workers contribute to productivity improvement and must get rewarded, along with direct workers.

This plan was developed by NSC and NPRDC personnel. They had a PGS design team, which developed the system for NSC and a steering group to oversee all PGS activities. There are six different organizational units that the productivity gains were computed

independently for each. Individuals within each unit receive the same award, based on their unit's performance. NSC accounts for indirect and support costs in each of the six different functions. The support unit receives an average of the overall Center's gain.

There is a 50/50 split of savings. To ensure quality, each production unit established performance measures and goals. Each of these are weighted to get an overall quality index score for each unit. The quality index directly effects the payout amount for each unit. If there is a quality deficiency, excess money not distributed goes into the Quality Deficiency Fund and can be recovered by employees later, if quality goes back up. If a group exceeds quality goals for 3 out of 4 quarters they get a special bonus drawn from the NSC share of savings. Thirty percent of the employees' share goes into a reserve pool. NSC reached an agreement with their sponsoring activity that their funding could not be reduced by more than 50% of the savings from the previous year.

They have a very complex performance measurement system utilizing the Objectives Matrix (See Sink (1985), for more information). Each unit invested an incredible amount of time developing their measurement system. The gain distribution is based on a moving average. The calculation is measured against a standard man-hour rate, which is called a PUR rate. Employees are still allowed to receive other incentive awards on top of their PGS bonuses. Each employee receives a report outlining the calculation to increase the visibility of PGS and of NSC's performance. Training was conducted to inform employees on how the system works and integrates with the other systems in the organization.

They have a Design Team, Steering Committee, Review Team, Implementation Team, and PGS Coordinator to operate their PGS system. The Comptroller Department is responsible for all measurements, calculations, and distributions. Their Employee Involvement System is based on Crosby's QIP process, which consists of 14 steps. NSC started their QIP initiative in 1988. Audits may be used to ensure policy adherence. They determined that Manage to Payroll (MTP) limits will need to be increased to make

payouts.

### 2.3.2.3 Naval Surface Warfare Center (NSWC); Dahlgren, VA

The NSWC was chosen to be included in a Naval Personnel Research and Development Center (NPRDC) project that assessed different Navy organizations relative to PGS readiness. NPRDC uncovered the following critical issues at NSWC:

- 1) There was a resistance to measuring productivity in technical areas.
- 2) PGS tends to be viewed as just another program.

NSWC developed a sample productivity measurement system using the objectives matrix, which scores and weights several performance measures to arrive at one final score. They determined that optimal usage of the matrix requires all measures to have an organizational level perspective.

There were three teams that made up the PGS design team: the measurement system, employee and customer communication, and employee involvement. The steering group oversees and authorizes all PGS activities. All of the design teams wanted the payout to be contingent on a customer satisfaction survey and distributed quarterly. They also were pursuing an MTP waiver for payouts. It was determined that the PGS system would be independent of other reward systems in operation at NSWC.

### 2.3.2.4 Pearl Harbor Shipyard (PHSY); Pearl Harbor, HI

This system was designed to give periodic cash awards to groups of machinists performing above a work standard. The design issues for this type of system were selecting a performance measure and determining the unit of measurement.

Their philosophy was that rewards should be given in proportion to the amount that

performance exceeds a set standard, not on an all or nothing basis. The standards are to be set at a point where approximately 30% of the employees are performing above the standard. Improved efficiency was selected to be the measure for the PHSY gainsharing system. There were efficiency measures as part of their existing Management Information System (MIS) that could be used for their measurement system. Shop superintendents were rewarded based on the performance of their workers, which was measured through these efficiency measures.

The inclusiveness of efficiency measures is crucial because the design team felt workers will concentrate their efforts on the measured areas of performance. Cross-charging of worker time could take place to inflate revenues or increase savings in the areas that are being measured. So, it was decided to measure all the shipyard's work at the line item level to ensure a comprehensive scope. The worker's time is constantly being charged to different foreman because of the matrix structure of the shipyard. The workers are organized into "work gangs." The more hours saved by a work gang the more incentives the gang receives. Foreman may receive incentives only when their entire shop shows man-hour savings. Employees earn incentives based on the amount of time you spent with a particular work gang and how much labor savings each gang accrued. This promotes identity with the groups that the employees work with.

#### 2.3.2.5 Naval Aviation Depot (NADEP); Cherry Point, NC

The objective of their PGS plan was to improve group productivity through process improvements, while reducing cost, and maintaining schedule and quality. They established a PGS committee, headed by a PGS coordinator to develop PGS policy and procedures. They used attitude surveys throughout the program to evaluate the employee's satisfaction with the plan. PGS effectiveness evaluations could also be ordered at any time by the Commanding Officer and the plan was subject to audit by appropriate agencies. In order to determine if PGS should continue at the NADEP, evaluation criteria were developed to judge the benefit of PGS. They used FY85 to

FY89 data as a baseline (5 years), and made PGS calculations quarterly, comparing the results to the baseline. Any improvement over these would be rewarded.

There are eligibility requirements to receive Productivity Gain Sharing Awards (PGSAs). Awards are calculated based on the monetary value of NADEP productivity increases and split 50/50 (employees-NADEP). The awards are distributed equally to all eligible employees. They multiply direct man-hours by a performance factor, and compare this to a base to determine the percent improvement. This produces a figure for labor savings. This savings is then added to materials savings to determine overall savings. Ten percent of the employees share is put into a reserve pool, which is used to correct errors. At the end of the year, any money left over in the Reserve Pool is distributed to the employees. Beneficial Suggestion distributions are subtracted from the calculation of savings, because management doesn't want to reward twice for the same improvement.

The schedule indices for the NADEP will be in units per man-hour. If the NADEP does not meet the acceptable schedule, an investigation will take place. Payouts will occur if schedule failures were determined to be due to external influence (not shared fate). There is also a Quality Index target that must be exceeded in order for payouts to take place. There is a catastrophic quality measure, where no payouts are made if there is a plane crash and the NADEP is determined to be at fault. If there is a severe flight mishap (NADEP liable), there won't be a payout for the quarter in which the mishap occurred. They have a hierarchical QMB structure, along with ad-hoc PATs that constitute their EI system.

#### 2.3.2.6 Naval Supply Center (NSC); Pensacola, FL

They used a 2 year trial period to determine PGS feasibility. Their guiding principles for designing PGS were as follows:

- obtain top-management commitment

- utilize participative management
- simplistic measurement and award calculation
- secure union participation
- appoint a PGS Coordinator
- establish a baseline to improve upon
- evaluate system periodically
- all aspects of the system must be auditable and verifiable

They used an "I Recommend" program to facilitate EI, which is very similar to a Beneficial Suggestion Program. Employees voted on the plan before implementation and then, after a few years, a continuation vote is planned. The PGS Committee recommends and authorizes any improvement tools that are needed like training, surveys, and PGS policies. NSC incorporated a series of quality indicators into their formula and when 70% of these indicators exceeds their goal, they can gainshare. Military employees get leave equal to the bonus that the civilians receive. There is a 50/50 split, between the employees and NSC.

Twenty percent of the Employee Share will go into the Reserve Pool and all leftover funds from the Reserve Pool will be paid back to the employees at the end of the year. A loss in any quarter will carry over to the next quarter until it goes black, where payouts can finally be made. A Quality Pool will accumulate on any quarter where the organization scores less than 90% in what NSC calls its "green indicators." The Quality Pool is taken out of the Employee Share. When the quality score is over 90% (high performance in quality), the quality pool transfers to the reserve pool, which is distributed to the employees at the end of the year. Any money left in the quality pool at the end of the year will go back to NSC. They received authorization from their sponsor stating that NSC budget cuts can not exceed 50% of the previous years savings.

NSC has a PGS coordinator to oversee operations and evaluate success and the PGS system is subject to audits. The production committee can create subcommittees to

investigate and resolve special problems. Each employee's individual PGS share is calculated based on their productive hours worked.

#### 2.3.2.7 Newark Air Force Station (NAFS); Newark, DE

They compare cost per unit to a baseline figure to determine the productivity gains. NAFS uses a share factor for each person, which was their hours worked multiplied by their salary. Bonuses are paid on a monthly basis as part of their paycheck. To ensure quality, NAFS integrated a recycle rate in the formula based on number of rejected units. The benefits experienced with PGS to date have been: labor savings, reduced overtime, decreased absenteeism and costs, increased output per paid man-day, and reduced material cost. The costs of PGS were found to be: implementation and administration costs. All the figures needed for their PGS formula are already reported, so measurement costs are minimized.

#### 2.3.2.8 Naval Avionics Center (NAC); Indianapolis, IN

NAC identified several critical issues in their PGS effort. These issues are common to all Navy activities attempting PGS. They are:

- overcoming MTP authorization limits
- measuring white-collar productivity
- measuring real dollars saved
- is increased productivity always doing more with less
- are workers working themselves out of a job
- relating PGS to other existing improvement programs
- does NOR have to be positive to make payouts
- will NAVCOMPT honor requests for increased MTP
- will MTP be lowered because of savings

The effort was driven up front by performance measurement development, prior to PGS development. Then, there was a merging of the measurement and PGS system. Each department developed their own measurement system to integrate with the Center's PGS system.

#### 2.3.2.9 Charleston Naval Ship Yard (CNSY); Charleston, SC

Their gainsharing plan was different than most Navy plans. In reality, they had a profit-sharing plan for the overhaul of 2 ships. They won a contract against Newport News for the overhaul of 2 Navy ships. CNSY established a ceiling price that was 130% of their target cost for the 2 overhauls. A profit was built into their bid, just as was the case with Newport New's bid. The savings were shared 50/50 with the employees and the CNSY share would be invested into facilities and equipment. All employees were eligible to receive equal shares, if they met a minimum productive time standard. Other incentives were still being issued, so the employee's would not concentrate their efforts just on the overhaul of the 2 ships. Total "profit" for gainsharing was determined to be 50% of the difference from final actual cost and target cost. The final cost was lower than the target cost and the employees received PGS checks of over \$800 each. The gainsharing system was disbanded after these payouts.

#### 2.3.2.10 Naval Aviation Depot (NADEP); Norfolk, VA

Productivity gains will be recognized each quarter where the baseline productivity average is exceeded. All gains are split 50/50, with 10% of Employees Share going to a Reserve Pool. The Reserve pool will be used to correct errors and leftover funds will be distributed at year's end. PGSA's will be distributed in equal shares to all. They created a PGS Committee to develop and implement the plan, consisting of representatives from all departments. The NADEP will utilize Attitude Surveys and audits by ad-hoc teams to assess PGS effectiveness. They use a 5-year moving base, building up from 1 year in 1986 until they have 5 years in their moving average. To



receive payouts, employees must be in a productive status for 62% of the time. All Beneficial Suggestion payouts are subtracted from savings. There are material and labor savings calculated and incorporated into the bonus. They must exceed a target Schedule Index and Quality Index goal before there can be PGSAs. There is also a severe flight mishap policy, which acts like a catastrophic quality index. No payouts will be made if any planes had a major malfunction due to NADEP workmanship. They have a QMB and PAT structure to facilitate their EI system.

### 2.3.3 Case Examples vs Research Questions

It was important to examine these gainsharing systems in the context of the research questions. Based on these cases, five gainsharing design parameters were identified. These are: funding source, distribution, performance measurement, employee involvement, and integration. This provided me with a framework to objectively examine these systems. Tables 2.1 and 2.2 on the following pages portray this analysis.

### 2.3.4 Summary of Case Study Design Parameters

This section provides a brief summary of the tables shown.

#### 2.3.4.1 Funding Source

It seemed that most private-sector companies supply their gainsharing system with money directly from their operating budget. They charge this expense as either a labor or overhead expense. In the Navy examples, most organizations had to prove labor savings and could use this money for PGS. Many activities subtracted money distributed for Beneficial Suggestion awards from their PGS pot and would carry over losses from previous periods. A few Navy activities had agreements with their sponsor that funding would not be cut by more than 50% of the previous year's savings.

Table 2.1. Design Parameters vs. Gainsharing Cases: Private-Sector

RESEARCH QUESTION #1  
DESIGN PARAMETERS

RESEARCH QUESTION #2  
INTEGRATION

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
McDonnell-Douglas		<ul style="list-style-type: none"> <li>• split 60-40</li> <li>• based on hours worked</li> <li>• quarterly distribution</li> </ul>	<ul style="list-style-type: none"> <li>• ROI is measure</li> <li>• 36 month moving base</li> </ul>	<ul style="list-style-type: none"> <li>• 40% of suggestions approved</li> <li>• each work group developed own idea handling system</li> </ul>	<ul style="list-style-type: none"> <li>• had 9 teams from throughout the company and a Steering Committee to design</li> </ul>	<ul style="list-style-type: none"> <li>• evaluated plan based on impact on: job security, profitability, customer satisfaction, and EI</li> </ul>	<ul style="list-style-type: none"> <li>• \$200 per employee per quarter</li> </ul>
Eggers Industries	<ul style="list-style-type: none"> <li>• take out of operating expenses</li> </ul>	<ul style="list-style-type: none"> <li>• split 55-45</li> <li>• 20% of employee's share placed in Reserve Pool</li> <li>• salaried employees can't get shares larger than the largest wage bonus</li> <li>• payouts are on a percentage of wages</li> </ul>	<ul style="list-style-type: none"> <li>• use an 18.5% profit-margin as their target measure</li> </ul>	<ul style="list-style-type: none"> <li>• had 7 Production Committees and a Screening Council for suggestion approval and implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• had a vote and 70% of employees approved new EIP</li> </ul>	<ul style="list-style-type: none"> <li>• had a 2-year trial period</li> <li>• 90% of employees voted to continue after trial period</li> </ul>	<ul style="list-style-type: none"> <li>• made payouts in 18 out of 24 months</li> <li>• av. yearly payout increased from \$1404, to \$1902, to \$3293 the 3rd year</li> </ul>
Volvo		<ul style="list-style-type: none"> <li>• split savings 25-75</li> <li>• both labor and capital savings are distributed</li> </ul>	<ul style="list-style-type: none"> <li>• used the following performance standards: quality index, spoilage, materials, added materials, direct-to-indirect ratio, and capital costs</li> </ul>	<ul style="list-style-type: none"> <li>• they had 1800 employees on 125 teams to work on improving their work area</li> </ul>		<ul style="list-style-type: none"> <li>• evaluated their plan based on: identity, participation and equity</li> <li>• 65% approved continuation of the plan</li> </ul>	<ul style="list-style-type: none"> <li>• bonuses averaged 10%</li> </ul>
American Valve		<ul style="list-style-type: none"> <li>• 25% of employee's share into reserve</li> <li>• monthly payouts</li> </ul>	<ul style="list-style-type: none"> <li>• used the ratio of product costs vs the sales value of production as their measure, had to be over 13%</li> </ul>	<ul style="list-style-type: none"> <li>• have 15 Production Committees with 3 members</li> <li>• one Screening Committee to oversee program</li> </ul>		<ul style="list-style-type: none"> <li>• had a 9-month trial period</li> <li>• 90% voted to continue</li> </ul>	<ul style="list-style-type: none"> <li>• bonuses averaged 5%</li> <li>• sales increased 37.5%</li> <li>• turnover dropped from 120% to 2%</li> <li>• production up and scrap down</li> <li>• man-hours per product were down</li> </ul>

Table 2.1. (cont)

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
Herman-Miller		<ul style="list-style-type: none"> <li>Each employee can receive individual performance objective and cost reduction bonuses in addition to gainsharing</li> </ul>	<ul style="list-style-type: none"> <li>measured effective use of: labor, materials, and money, along with customer service</li> </ul>	<ul style="list-style-type: none"> <li>23 (30-40 members) departmental and 1 screening committee(s) to develop and impl. improvements</li> <li>there is a collateral representative structure to handle suggestions</li> <li>av. of .85 suggestions per employee per year</li> </ul>	<ul style="list-style-type: none"> <li>had 3 sub-committees for gainsharing design and implementation: Education &amp; Communication, Rules &amp; Regs, and Equity</li> </ul>	<ul style="list-style-type: none"> <li>a "secret" ballot revealed a very positive attitude towards gainsharing</li> </ul>	<ul style="list-style-type: none"> <li>averaged 15% bonuses</li> </ul>
Morse-Borg & Warner		<ul style="list-style-type: none"> <li>1/3 of employee's share into reserve</li> <li>had a monthly gainsharing newsletter</li> </ul>	<ul style="list-style-type: none"> <li>used a Rucker bonus formula</li> <li>used payroll as a percent of sales as their measure</li> </ul>	<ul style="list-style-type: none"> <li>used a Scanlon committee structure</li> <li>had 16 Departmental Production and one Screening Committee(s), along with a Recommendation Committee</li> </ul>		<ul style="list-style-type: none"> <li>they monitor: grievances and labor relations, turnover, absenteeism, the productivity index, and the bonus</li> </ul>	<ul style="list-style-type: none"> <li>averaged over 5% bonuses</li> </ul>
Butler		<ul style="list-style-type: none"> <li>had a 40-60 split</li> <li>1/3 of employee's share goes into reserve</li> </ul>	<ul style="list-style-type: none"> <li>they measure plant and office productivity, scrap, and number of claims</li> </ul>	<ul style="list-style-type: none"> <li>work groups do problem-solving and forward to screening committee for authorization</li> <li>79% of suggestions accepted</li> </ul>	<ul style="list-style-type: none"> <li>conducted educational meetings with all employees prior to implementation</li> <li>conducted an assessment survey to determine readiness</li> </ul>	<ul style="list-style-type: none"> <li>attitude surveys indicated that 98% wished plan to continue</li> </ul>	<ul style="list-style-type: none"> <li>sales and profits increased</li> <li>improvements occurred in: labor, OH, materials usage, productivity, and QWL</li> <li>In 1.5 years, distributed \$500 per worker</li> <li>22% increase in productivity</li> <li>teams are solving problems and relieving managers</li> </ul>

Table 2.1. (cont)

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
Nucor	<ul style="list-style-type: none"> <li>• company set aside 1.5% of pre-tax earnings for rewards</li> <li>• 8.5% of this was set aside for employee retirement</li> </ul>	<ul style="list-style-type: none"> <li>• employees could receive equal, extraordinary bonuses based on company profit</li> </ul>	<ul style="list-style-type: none"> <li>• rewarded based on man-hours per ton</li> <li>• Dept. Heads and management rewarded based on profit</li> <li>• Indirect workers rewarded based on the ROA</li> </ul>				
Sherwin-Williams		<ul style="list-style-type: none"> <li>• employee bonuses had a cap of 15% of base pay</li> </ul>			<ul style="list-style-type: none"> <li>• gave all employees SPC training prior to gainsharing</li> </ul>		<ul style="list-style-type: none"> <li>• experienced cost savings</li> </ul>
Crown Zellerbach							<ul style="list-style-type: none"> <li>• Increased communications</li> <li>• 13% rec. bonus checks first year and 6% next</li> </ul>
Columbus Auto Parts		<ul style="list-style-type: none"> <li>• distributed a quarterly newsletter</li> </ul>	<ul style="list-style-type: none"> <li>• used the ratio of direct to indirect labor as their measure</li> </ul>		<ul style="list-style-type: none"> <li>• gainsharing system was implemented and managed by 3 committees: departmental, labor-management, and executive</li> </ul>		<ul style="list-style-type: none"> <li>• increased communications</li> </ul>
Midland Ross		<ul style="list-style-type: none"> <li>• 25% goes into reserve</li> <li>• distribute bonuses monthly</li> </ul>	<ul style="list-style-type: none"> <li>• use allowable payroll as their measure, anything below is savings</li> </ul>	<ul style="list-style-type: none"> <li>• operate using a series of production committees to approve and help implement suggestions</li> </ul>			
Jamesbury Valve				<ul style="list-style-type: none"> <li>• the committee approves suggestions and develops bonuses</li> <li>• have a 75% adoption rate</li> </ul>	<ul style="list-style-type: none"> <li>• have a 40 member Rucker committee to manage the program</li> </ul>		<ul style="list-style-type: none"> <li>• distributed 9% bonuses</li> <li>• cost only \$50K to implement</li> </ul>

Table 2.2. Design Parameters vs. Gainsharing Cases: Navy Facilities

RESEARCH QUESTION #1  
DESIGN PARAMETERS

RESEARCH QUESTION #2  
INTEGRATION

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
NARDAC, Norfolk	<ul style="list-style-type: none"> <li>Beneficial Suggestion awards are deducted from PGS funds</li> </ul>	<ul style="list-style-type: none"> <li>50-50 split</li> <li>25% into Reserve Pool</li> <li>10% deposited into the CSS Fund</li> <li>equal PGS shares are distributed</li> <li>leftover Customer Satisfaction Survey (CSS) funds are invested into the NARDAC</li> </ul>	<ul style="list-style-type: none"> <li>use a target productivity gain, which must be met before bonuses are distributed</li> <li>used a 1-year moving average as their base</li> <li>ratio of revenues to costs is their main measure</li> </ul>	<ul style="list-style-type: none"> <li>had an unsuccessful QCs program</li> <li>each dept. sets their own customer satisfaction measures</li> <li>Use a QMB structure with ad-hoc PATs for EI</li> </ul>	<ul style="list-style-type: none"> <li>NPRDC assisted in assessing feasibility and initial design</li> <li>design and implementation team consists of reps from entire center</li> </ul>	<ul style="list-style-type: none"> <li>used a 3-year pilot period</li> </ul>	
NSC, Oakland	<ul style="list-style-type: none"> <li>sponsor can't cut more than 50% of previous years savings</li> <li>they compute gains for 6 different departments</li> </ul>	<ul style="list-style-type: none"> <li>30% of employee share put into Reserve Fund</li> <li>50-50 split</li> <li>marginally performing employees do not receive payouts, dictated by performance appraisal</li> <li>equal shares for all employees in the unit</li> <li>support unit receives the average payout for the Center</li> <li>each employee receives a report outlining the bonus calculations</li> </ul>	<ul style="list-style-type: none"> <li>each unit has performance measures and goals</li> <li>objectives matrix gives one score, which dictates payouts</li> <li>quality deficiency fund accumulates when scores are low</li> <li>use a moving baseline</li> <li>if a unit exceeds goals in 3 out of 4 quarters they get a special bonus</li> </ul>	<ul style="list-style-type: none"> <li>are very active in the Crosby, QIP program</li> </ul>	<ul style="list-style-type: none"> <li>assisted by NPRDC in developing the plan</li> <li>design team conducted interviews throughout the Center to identify possible problems</li> <li>had a Design Team and Steering Team to manage PGS</li> <li>Comptroller is responsible for all measurements</li> </ul>	<ul style="list-style-type: none"> <li>at the end of the fiscal year an official evaluation is conducted and improvements are made</li> <li>subject to audits</li> </ul>	
NSWC, Dahlgren		<ul style="list-style-type: none"> <li>payouts are made quarterly</li> </ul>	<ul style="list-style-type: none"> <li>developed a series of performance measures and use the objectives matrix to assess performance</li> <li>payouts are contingent on customer sat. survey</li> </ul>		<ul style="list-style-type: none"> <li>NPRDC conducted a readiness survey</li> <li>had a design team with three groups: measurement, employee and customer communication, and EI</li> </ul>		

Table 2.2 (cont)

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
PHSY, Pearl Harbor		<ul style="list-style-type: none"> <li>standards were set so that 30% of employees are performing above it</li> <li>shop superintendents are rewarded based on their work groups</li> </ul>	<ul style="list-style-type: none"> <li>each work "gang" has to perform above a certain performance standard for efficiency</li> <li>track hours saved by each gang</li> <li>measures were already tracked by their MIS</li> <li>they track work at a line item level</li> </ul>				
NADEP, Cherry Point	<ul style="list-style-type: none"> <li>savings are accrued based on monetary value of productivity increases</li> <li>material savings are also accumulated</li> <li>Bene Suggs are subtracted from pot</li> </ul>	<ul style="list-style-type: none"> <li>50-50 split</li> <li>10% goes into Reserve</li> <li>equal distributions</li> <li>make payouts quarterly</li> </ul>	<ul style="list-style-type: none"> <li>use a 5 year moving baseline</li> <li>measure increased productivity</li> <li>they multiply direct man-hours by a performance factor to determine labor savings</li> <li>must exceed a target quality index before payouts are made</li> <li>have a severe flight mishap policy</li> </ul>	<ul style="list-style-type: none"> <li>have a QMB structure to approve and implement improvement ideas</li> </ul>	<ul style="list-style-type: none"> <li>they have a PGS Committee to manage the program, headed by a PGS Coordinator</li> </ul>	<ul style="list-style-type: none"> <li>utilize attitude surveys for employee satisfaction</li> <li>the CO can order PGS effectiveness evaluations</li> <li>can be audited by appropriate agencies</li> </ul>	<ul style="list-style-type: none"> <li>improved group productivity, while reducing costs and maintaining schedule and quality</li> </ul>
NSC, Pensacola	<ul style="list-style-type: none"> <li>losses will carry over until the PGS pot goes black</li> </ul>	<ul style="list-style-type: none"> <li>when over 90%, payouts are made from the Quality Pool</li> <li>50-50 split</li> <li>military gets leave equivalent to civilian bonus shares</li> </ul>	<ul style="list-style-type: none"> <li>use series of quality indicators</li> <li>can gain share when 70% of these indicators exceeds their goal</li> <li>A Quality Pool accumulates when they score less than 90%</li> </ul>	<ul style="list-style-type: none"> <li>have an "I Recommend" program</li> <li>create sub-committees to investigate special problems</li> </ul>	<ul style="list-style-type: none"> <li>PGS Committee designed and oversees the system, headed by PGS Coordinator</li> </ul>	<ul style="list-style-type: none"> <li>had a 2-year trial period</li> <li>subject to audits</li> </ul>	

Table 2.2 (cont)

RESEARCH QUESTION	1a) MONEY SUPPLY	1b) DISTRIBUTION	1c) PERFORMANCE MEASUREMENT	1d) EMPLOYEE INVOLVEMENT	2a) IMPLEMENTATION	2b) EVALUATION	2c) BENEFIT
NAFS, Newark		<ul style="list-style-type: none"> <li>distributed payouts based on salary</li> <li>distributed monthly as part of their paychecks</li> </ul>	<ul style="list-style-type: none"> <li>measure the cost per unit and compare to a baseline</li> <li>used a recycle rate to ensure quality</li> <li>all measurement data was already reported</li> </ul>				<ul style="list-style-type: none"> <li>experienced labor savings</li> <li>reduced: costs, OT, absenteeism, material waste, and backlog</li> <li>increased output per man-hour</li> </ul>
CNSY, Charleston	<ul style="list-style-type: none"> <li>had a profit-sharing plan</li> <li>50% of the profit, between a target price and actual price was for gainsharing</li> </ul>	<ul style="list-style-type: none"> <li>50-50 share</li> <li>all received equal shares</li> </ul>					
NADEP, Norfolk	<ul style="list-style-type: none"> <li>Beneficial Suggestion awards subtracted from pot</li> </ul>	<ul style="list-style-type: none"> <li>50-50 split</li> <li>10% goes into Reserve</li> <li>employees must have worked 62% of the quarter</li> </ul>	<ul style="list-style-type: none"> <li>used a 5-year moving average to measure productivity</li> <li>had to exceed targets for schedule and quality indices before any payouts</li> <li>had a severe flight mishap policy</li> </ul>	<ul style="list-style-type: none"> <li>used a QMB structure with ad-hoc PAT teams</li> </ul>	<ul style="list-style-type: none"> <li>the PGS Committee developed the design and implemented the system</li> <li>The Committee has representatives from all departments</li> </ul>	<ul style="list-style-type: none"> <li>used attitude surveys to determine employee satisfaction</li> <li>planned to use ad-hoc PGS evaluation teams</li> </ul>	

#### 2.3.4.2 Distribution

The average private and public sector organization split the PGS money 50-50 with their employees and deposited 15-25% of the employee's share into a Reserve Pool. Almost all organizations had distribution schemes that were highly objective and didn't use any judgement. They distributed as a function of: time worked, salary, or simply equal shares. In most cases, eligible employees must have worked a certain number of days and received a satisfactory performance rating. Most organizations had other types of incentives that employees could receive in addition to their gainsharing system. Usually PGS systems distribute bonuses on a monthly to a quarterly basis as a separate check. The employees also receive a report outlining the bonus calculation and other gainsharing activities.

#### 2.3.4.3 Performance Measurement

All organizations distributed payouts that were contingent on performance measures. Some had a set of performance measures and several used the Objectives Matrix to arrive at one final score. Other organizations used only one macro-level measure such as: ROI, ROA, profit-margin, or payroll/sales, and man-hours per product. Many organizations had quality, schedule, and customer satisfaction indices that would also effect payouts. The higher the score the higher the payouts would be. Some systems set performance targets in addition to their "main" measure(s), where a certain score had to be reached before payouts would be made.

#### 2.3.4.4 Employee Involvement

I could find no cases where one person or group decided on group or individual level gainshare amounts. Almost all organizations had a very active Employee Involvement (EI) system. Many of these had a Quality Management Board (QMB) structure created along organizational lines to gather improvement ideas from the employees and then



assist in implementing them. Performance Action Teams (PATs) are used on an ad-hoc basis to correct identified problems. They usually had a Screening Committee to authorize all EI activities. Some organizations were less formal and used a simple Beneficial Suggestion system as their EI system. Companies averaged a suggestion approval rate of about 60%.

#### 2.3.5.5 Integration

Organizations normally do a readiness assessment by conducting surveys and interviews, before seriously looking at gainsharing. Quite a few organizations even had their employees vote on whether they wanted gainsharing. Some conducted meetings and held training to prepare employees for gainsharing. Almost all organizations formed a design team, which consisted of representatives from throughout the organization. This design team normally transformed into the implementation team and then into a steering committee to manage the PGS system. In many cases, this team was also the screening committee for the EI system. This team was usually headed by a full-time PGS Coordinator. In some cases, the team was broken up into several sub-committees to examine major components of the GS system.

Some of the organizations used a 2-3 year trial period or a pilot study and let employees vote on whether to continue with gainsharing (normally with a 90% approval rate), before fully committing to it. The design team develops evaluation criteria before implementing the plan and the effectiveness of the system is judged against these. At the end of the year, the steering committee evaluates the program and makes improvements. Many organizations used employee attitude surveys to assess satisfaction with the plan. The Navy PGS plans are subject to audits by their parent agency.

Most organizations experienced an increase in sales, profits, customer satisfaction, labor-productivity, and communications as a result of their gainsharing system. They reported reductions in costs and material waste. The average bonus seemed to fluctuate around

10% of base pay.

## 2.4 Supporting Behavioral Theories/Concepts

Gainsharing design issues can be better understood by examining related behavioral theories. It is critical to have a working knowledge of these theories to facilitate the design of an effective GS system. These theories will be examined at a general level by defining the general theory. There are also many behavioral concepts that will be operationally defined and discussed.

### 2.4.1 Motivational Theory

Several of the major motivational theories, will be outlined and their impact on gainsharing design will then be probed. Nordstrom & Hall (1986) state that motivation is the result of recognizing and rewarding performance improvements in a meaningful and timely way.

#### 2.4.1.1 Herzberg's Motivator-Hygiene Theory

Herzberg found that there are two general sets of needs that people strive to fulfill: hygiene and motivators. The hygiene needs are those which are basic to survival and that help someone to maintain their present state. The motivators are growth needs and contribute to job satisfaction (Pinder, 1984).

GS can contribute to both sets of needs. It can satisfy hygiene needs by increasing someone's take-home pay. It can also satisfy motivator needs by increasing the employee's ability to contribute to their organization through improved employee involvement.

#### 2.4.1.2 Maslow's Hierarchy of Needs

Maslow defines a list of needs that all people seek to satisfy. These are (in order of importance): physiological, security, belongingness, self-esteem, and self-actualization. When lower level needs are satisfied (most important), you seek to move up to the next level and satisfy those needs (Moorhead & Griffin, 1989).

A larger paycheck will help satisfy the lower two needs. Gainsharing can address belongingness needs by creating more team-oriented activities through the employee involvement system. EI can also improve self-esteem by providing channels for employees to have input to the organization and the opportunity for them to witness the results.

#### 2.4.1.3 Equity Theory

Equity theory states that individual's will assess the "inputs" they contribute to an organization. Some examples may be: educational level, past experience, hours worked, and effort expended. People then assess the outcomes they receive, relative to their inputs. Some examples of outcomes may be: pay, level of responsibility, or decision-making power. Each worker will compare the ratio of inputs to outcomes against their co-workers' ratios to evaluate how equitably they are treated. If it is felt that inequities are present, workers may either demand for improved outcomes or decrease their inputs to correct the perceived inequities (Pinder, 1984).

Most inequities are caused because of misperceptions and a lack of communication. Since PGS rewards the entire organization and everyone is aware of the formula, inequities will be minimized. The EI system will provide more open communication. Also, a GS system that is perceived to be very equitable and fair may help overcome other inequities employees may have with different areas of their organization.

#### 2.4.1.4 Expectancy Theory

The basic model, developed by Victor Vroom, suggests there are three factors that contribute to the level of effort someone will exert in an activity. First, the probability that a level of effort will lead to a certain level of performance is estimated by the person. Second, given the predicted performance, the expectancy of outcomes from your performance is assessed. Third, the valence (saliency) of the outcomes is assessed. The summation of these will dictate how that person will behave (Moorhead & Griffin, 1989). If the positive outcomes outweigh the negative outcomes and the level of performance required to achieve these outcomes will take a reasonable amount of effort, the person will most likely partake in the activity to achieve these desired outcomes.

Viewed in the context of expectancy theory, PGS attempts to increase the valence of outcomes for the employees. These positive outcomes can be: increased job satisfaction and teamwork, along with monetary bonuses. Through a properly designed and open performance measurement system, the performance to outcome expectancy will be easier for employees to assess. These two areas could help increase their efforts to achieve these desired outcomes, thus improving the organization.

#### 2.4.2 Behavioral Theory

Several theories focus on the behavior itself, rather than on a person's inherent values and attitudes.

##### 2.4.2.1 Reinforcement Theory

Reinforcement Theory, also called Operant Learning Theory, was developed by B.F. Skinner. The basic principle suggests that behavior is a function of its consequences. These consequences are called reinforcers, if they promote a desired behavior and punishers, if they discourage an undesirable behavior (Pinder, 1984). Reinforcers and punishers can be either positive or negative, if you add something or take something away, respectively. The object of an incentive system is to present positive reinforcers

to employees that they can obtain if they behave in desirable ways.

A gainsharing system tries to increase the productivity of an organization by extending monetary reinforcers for productive behaviors. The association between behaviors and rewards is not direct, nor immediate for the individual employee because the collective behavior of the organization is being assessed with most GS systems, and then rewards distributed. But, if employees trust the measures used to assess organizational performance and they have faith that their fellow employees will contribute equally, and they value the GS payout amounts, then employee behaviors can be reinforced through an organizational gainsharing system.

#### 2.4.2.2 Management of Behavior and Results

Brumback (1988) developed a taxonomy of behaviors vs. their outcomes. He states there are desired and undesired behaviors people will exhibit in an organization. The outcomes of these behaviors can be either beneficial or not beneficial to the organization. For example, you can behave undesirably but achieve an outcome that is beneficial to organizational success; he calls this a negative success. An example in this area might be: unethical acts to enable your organization to increase profits. This taxonomy is shown on the following page, in Figure 2.2.

Brumback's taxonomy can be used to analyze a single behavior or a set of behaviors. He calls this Managing Behaviors and Results (MBR). We want to do the following with MBR:

- achieve positive successes
- avoid negative successes and failures
- be hospitable to positive failures.

The only quadrant that we want to operate in is achieving positive successes. This is

## MANAGING BEHAVIORS AND RESULTS

		OUTCOMES	
		NOT BENEFICIAL	BENEFICIAL
BEHAVIORS	DESIRED	POSITIVE FAILURE	POSITIVE SUCCESS
	UNDESIRE	NEGATIVE FAILURE	NEGATIVE SUCCESS

Source: Brumback (1988), Some Ideas, Issues, and Predictions About Performance Management,  
Public Personnel Journal.

Figure 2.2. Managing Behaviors and Results

accomplished by communicating specifically what results are desired and the appropriate paths to get there. The organization must define behavior goals for the entire organization.

GS sets an overall organizational goal of improved productivity. Employees are then made aware of the behaviors which will help achieve this end through proper training. When organizational productivity increases, desired behaviors (positive successes) are reinforced through productivity bonuses.

#### 2.4.2.3 Geller's Triangle

Geller (1982) maintains that the best strategy to conduct change in a large-scale organization is to isolate and address the behaviors of its members. His work is mostly focused on changing a behavior of a large population group, such as increasing safety belt use of young people. This logic can be applied to changing the behaviors of employees in an organization.

Geller developed a behavioral triad, which depicts behavior as a function of the person and their environment. Behaviors are more easily identified and measured than attitudes and values, so it becomes more easy to manage (see Brumback also). Each person has their own individual set of: knowledge, skills, and values, which contributes to their behavior. The environment provides: equipment, working conditions, and incentives, which will also dictate behavior. Changes to behavior can be achieved through modifications to the employees and/or the work environment.

Geller outlines a methodology for changing selected behaviors, through environmental interventions. He defines this as the Antecedent-Behavior-Consequence (ABC) approach. Behaviors can be modified by defining specific antecedents, which if accompanied by a desired behavior, will result in desired consequences. This also holds true for discouraging undesirable behaviors. The antecedents and consequences normally take

place in the environment leg of the triad (see Figure 2.3). The ABC approach is very similar to reinforcement theory and MBR.

Gainsharing can be viewed in the context of this model. An organization integrating gainsharing as a part of their management systems will make changes affecting both the employees and the work environment that will change their behaviors. The behaviors in question are normally associated with improved productivity and are dictated by the goals of the gainsharing system, which will vary for different organizations. Changes in each employee's knowledge and skills will result from increased training and employee beliefs will be influenced by more open communications associated with employee involvement. Environmental changes will consist of: performance measurement, gainsharing bonuses, and a more performance aware corporate culture. These environmental characteristics will provide antecedents for employees to continue with their improvement-oriented actions, which will result in the consequence of better performance and gainsharing bonuses.

### 2.4.3 Attitudes Towards the Organization

The job satisfaction and organizational commitment of the employees are normally desired outcomes of a gainsharing system. These will be investigated in this section.

#### 2.4.3.1 Job Satisfaction

There are organizational, group, and personal factors that will influence someone's job satisfaction level. Job satisfaction can be correlated to turnover and absenteeism, which will effect the performance of the organization (Moorhead & Griffin, 1989). Studies have shown that an individual's job satisfaction doesn't have any discernable effect on their job performance, though.

Based on the cases that I investigated, it seems that gainsharing may reduce turnover and



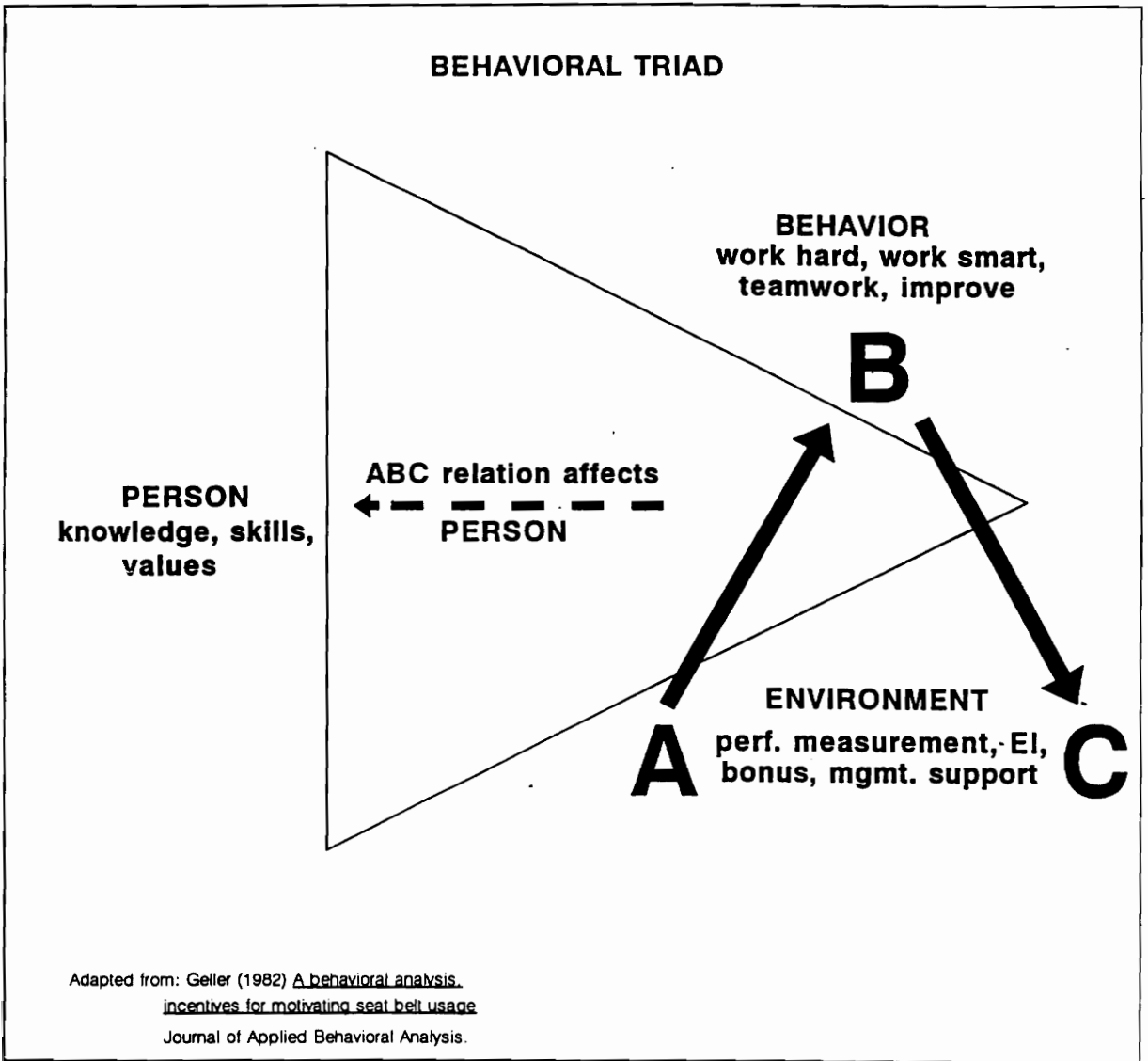


Figure 2.3. Behavioral Triad

absenteeism, therefore signifying increased job satisfaction. Improvements in these areas may very likely improve an organization's mission effectiveness.

#### 2.4.3.2 Organizational Commitment

Commitment to the organization will influence behaviors like turnover and absenteeism. A person who is organizationally committed will possess the following traits: 1) acceptance of the organization's goals; 2) willingness to exert effort for the organization; 3) desires to remain a member of the organization (Pinder, 1984). Moltaz (1986) believes that organizational commitment leads to a more stable and predictable attitude than job satisfaction and is a better predictor of work behavior.

GS attempts to increase employee commitment by increasing employee involvement and communication. It also provides an organizational identity by allotting organizational performance-based rewards.

#### 2.4.4 Organizational and Contextual Factors

There are certain organizational traits that should be understood to better facilitate a more effective approach to gainsharing.

##### 2.4.4.1 Organizational Change

Both employees and management must understand the need for a change. There will be some productivity loss as employees work to understand what this change means and try to behave accordingly (Schlesinger & Balzer, 1985). Any modifications must be responsive to changing market conditions, such as possible funding reductions. The organization must define the few important cultural characteristics or guiding principles that best support these new strategies, so employees can act and be rewarded accordingly. Initial success targets for change should be set; these targets should be brief

and measurable to help provide momentum to the employees executing the change (Debettignies, 1989).

Actions are needed to help employees understand and respond to change, and the support staff must operate to help the employees handle the change. GS training will address this issue. Bettman (1989) believes you should integrate fun and applicability into the change process by having celebrations for meeting major goals.

All other organizational functions/systems must be consistent and aligned with the change philosophy. Contradictory signals will destroy the momentum needed for change. All managers must be careful to act according to your GS guiding principles for changes. Hatcher & Ross (1985) state that gainsharing can be viewed as a powerful change agent capable of developing a workforce in a manner not possible with traditional Organizational Development interventions, which are being used in a piece-meal fashion. Gainsharing can bring about a long-term, comprehensive change in an organization's management philosophy by: creating new roles for managers, breaking down barriers to communication, boosting cooperation, building a stronger sense of company, and having greater employee involvement.

#### 2.4.4.2 Organizational Culture

Organizational culture is defined as a set of strong and common values held by employees throughout the organization. These values dictate what is viewed as good and bad behaviors (Moorhead & Griffin, 1989). Recognizing culture is a critical piece of the change process, some of these values may be essential in promoting behaviors that increase the organization's productivity.

Miller & Schuster (1987) say culture is the most critical element to a gainsharing plan's success. Internal cultural inconsistencies can lead to gainsharing's downfall. Resistance from the management cadre is very difficult to detect and can inflict serious damage on

the culture if not properly addressed. Proper assessment of the organizational culture is crucial to evaluating GS feasibility.

#### 2.4.4.3 Team Orientation

Teams will make most of the important advances in the future. An increased significance is being placed on the ability to work well in a group, both technically and interpersonally (Mower & Wilemon, 1989). To promote a team atmosphere, performance must be appraised and rewarded as a team (Galagan, 1986). This is the basic premise of gainsharing.

If your company has no tradition of employee involvement and teamwork, the transition to gainsharing will be traumatic. A prerequisite to successful gainsharing is that employees must accept workers as teammates and be willing to work together.

### 2.5 Incentive Principles

In addition to examining relevant behavioral theories/concepts, it was very beneficial to specifically investigate some of the major issues impacting incentives in organizations.

#### 2.5.1 Performance

Improved organizational performance is the ultimate goal of every organizational intervention and it is normally the goal of most incentive systems. Without a global view of performance, an intervention may have a positive effect in the areas being focused on, but a negative effect on others. Sink & Tuttle (1989) define performance as the combination of 7 criteria. These are: productivity, effectiveness, efficiency, quality, innovation, quality of work life, and profitability. Many author's call this a Family of Measures (FOM) approach to measurement. FOM defines the areas that need to be measured to properly evaluate overall organizational performance.

Most gainsharing systems seem to measure only productivity, when assessing performance improvement. This is not necessarily bad, because productivity improvements will almost always have a positive effect on the organization. But, one needs to have a holistic view of improvement to have the most positive effect on organizational performance. The purpose of incentives is to increase overall employee performance, which in turn will lead to increased organizational performance. Rimland & Larson (1986) outline 3 steps to increase the performance of employees.

- 1) Personnel selection, assignment, and promotion
- 2) Flexible and adaptive training and job design options
- 3) Personalized incentive systems

These three steps tell indicate the need to get the right people in the right jobs, refine and develop their skills, and reward them for using these skills to benefit the organization.

### 2.5.2 Elements of Effective Incentives

Organizational and employee desired outcomes are not mutually exclusive. Trying to match the desires of these two entities is the key to designing effective compensation systems. Managers must build links between the behaviors they expect and the results they are trying to achieve. Ross (1984) discusses 4 general attributes of an effective incentive system.

- 1) Built around clearly articulated goals.
- 2) Employees must know how much they can earn at the beginning of the incentive period.
- 3) After the fact judgement in determining awards is spelled out at the beginning of the period.
- 4) Long-term performance is also stressed.

The type of incentives that are issued are important. They can be either on a performance contingent or task contingent basis. Tripathi & Agarwal (1985) did a study that showed performance contingent rewards lead to better performance and a greater task involvement than non-contingent rewards. Also, when rewards contain a degree of competence information, intrinsic motivation increases. Podsakoff (1985) reached similar conclusions.

Reward contingencies have been a popular item to research. Performance contingent rewards are given as a function of your performance. Task contingent rewards are given merely for completing a task, regardless of the quality of your efforts (Earn, 1983). Pay in organizations is mostly task contingent (i.e., hourly pay, and salaries). There are quite a few experimenters that tried to test task contingent vs. performance contingent reinforcement to assess and compare their effect on performance and satisfaction (i.e., Earn, 1983; Tripathi & Agarwal, 1985; Podsakoff, 1985). They all stated the same conclusion, performance contingent rewards produce higher performance and greater task interest. Task contingent rewards did result in slightly higher performance than in a no rewards situation, but considerably lower than performance contingent rewards.

R&D activities have a high percentage of technical workers. Mower & Wilemon (1989) lists 4 principles for rewarding the technical worker that should be considered when designing an incentive system.

- 1) It's the recognition that counts with technical professionals, as long as the rewards are enough.
- 2) Recognize and support intrinsic motivation.
- 3) Reward technical teams and the individuals within them, but lean more towards the team.
- 4) Avoid being a team parent.

### 2.5.3 Incentives in the Government

Organizations operating within the confines of the federal government have special considerations pertaining to incentives. Nordstrom (1988) believes ideal incentives in government should have above average employees receive merit increases, in addition to Cost of Living Allowances (COLAs). He states that any incentive system must pass public scrutiny as fair, because they are the ultimate supplier of the funds. The paradox to this issue is that most federal employees believe tax payers are getting more than their money's worth out of their efforts, while the tax payers believe the opposite to be true.

Public-sector organizations normally must use several performance measures, since no bottom line exists. These measures must be vital to the success of the organization for the incentive system to operate effectively. There also needs to be a balance between discretion and objectivity because the service orientation of most federal agencies doesn't lend itself to production-style measures. Crystal & Silberman (1986) advise government agencies to start incentive systems out conservatively and then let it expand because of the public scrutiny that may occur if the system is a washout.

#### 2.5.4 Performance Measurement

There has been a tremendous amount of literature published in the area of performance measurement. The first step in developing performance measures is to specifically define your organization's approach to performance. This was mentioned in Section 2.5.1. The three basic steps in developing a performance measurement system are: selecting, scaling, and integrating measures. Some specific measurement techniques will also be reviewed.

##### 2.5.4.1 Selecting Measures

There are many outputs and inputs that can be measured, along with outcomes. The performance measures must be significant to operations, understandable, and the inputs/outputs controllable by participants (Boyett, 1987). The measures can be either

improvement or control-oriented. Control measures basically track operations and consist of raw data such as number of: employees, man-hours, products produced. Improvement measures seem to be merely manipulated control measures. For example, tracking man-hours per product over time will tell you the productivity improvements that your workers are achieving. Ross (1984) states that a reward-orientation towards incentives, will create a more "common-fate attitude. In contrast, a control-orientation will foster a detrimental "us vs. them" attitude. Gaining upon past performance is the basic philosophy of gainsharing, and developing the correct performance improvement measures is one of the most important prerequisites to effective gainsharing.

Stein (1986) expressed a belief that measurement in the public-sector should be done at the jurisdictional level. This means focusing on measuring the end-products of services, those most important to citizens. Efficiency is the most frequently used measure in the public-sector; effectiveness is more appropriate, but more difficult to measure. Government service does not lend itself to a single measure such as profit. So, the appropriate way to assess public services is in terms of their impact or success in acquiring public goods (Stein, 1986). Outputs are workload measures. Outcomes should be stressed most when developing public-sector performance evaluation systems.

In the white-collar/service sector realm, you must be extra careful when selecting measures. White-collar measures tend to be more ambiguous and ill-defined than the manufacturing realm. The employee's product is generally very far upstream from the final product and the work tends to be intangible and non-repetitive. The customer's needs are not well defined and the process used is not pre-optimized (Hauck, 1982). It is difficult to develop objective performance measures in service-oriented agencies because there is a lower level of accountability (Dulworth & Usilaner, 1987).

#### 2.5.4.2 Scaling Measures

Once measures are selected, there needs to be a value-laden scale created to determine



what is good and bad performance. Evaluation against the performance measures can be based on a baseline, standard, or target. Crystal & Silberman (1986) believe 3 levels of performance exist: minimum, target or normal performance, and maximum. To develop a continuous scale, you can define a performance curve going through these three points, with the min and max as end points.

Spicer (1985) believes that there are three types of measurement systems, those based: against a standard, against others, and on group effort. Printz & Waldman (1985) feel the reward granted needs to address the level of achievement attained and not just reward on an all or nothing basis, which would be more of a target performance level philosophy. That is why performance scales are encouraged in lieu of simple targets.

#### 2.5.4.3 Integrating Measures

Gainsharing measures are not a substitute for improvement-oriented measurement systems. In many cases, gainsharing must be integrated with the existing measurement systems (Sink, 1985). Although one can choose to base a gainsharing formula on an improvement-oriented measurement system, a very critical area to measure is in financial improvement, which is already being monitored quite closely. Examine this list of measures to ensure both areas are covered. Ross (1984) stresses considering both financial and performance productivity, so that we are not rewarding for meeting goals, while at the same time losing money.

Surrogate measures may be used to assess traits that are very difficult to directly measure, such as quality of work life and communication effectiveness (Beck, 1992). The importance of various measures should be tested and the employees must be able to impact these for the measurement system to operate effectively. In the beginning, tie gainsharing to a high level measure like profit. Once historical data is developed, a regression analysis can be performed to identify related measures/indicators. Any system that is developed must deal with the peaks and valleys of performance and also be able

to identify performance declines that are not due to the employees. It is possible to choose to employ a secondary measure such as profitability, in addition to primary measures (like customer satisfaction) to ensure the overall organization is performing satisfactorily (Hurel, 1991). Rossler (1991) cautions, as the number of measures being used increases, so does the number of causal relationships participants must understand increases. This will greatly increase the complexity of the system.

#### 2.5.4.4 Specific Measurement Techniques

Any organization may choose to adopt a specific technique for measuring performance. Sink & Tuttle (1989) discuss 2 measurement methodologies, Total Factor Productivity Measurement Model (TFPMM) and the Multi-Criteria Productivity/Performance Measurement Tool (MCP/PMT). The TFPMM measures financial productivity, while correcting for price increases in your product. This is a good tool to determine "true" financial productivity. The MCP/PMT helps to develop scales for the organization's most critical measures. It then gives you a final "score" of performance based on the weights of the selected measures and their scores. This method is similar to the widely used Objectives Matrix, mentioned previously. Rossler (1988) used the Total Factor Productivity Measurement Model (TFPMM) to measure organizational performance, which was used to drive the gainsharing payout. He also incorporated a visibility system to make performance known to employees and explain why payouts were at certain levels.

Moser (1985) collected data on how 124 R&D managers viewed their company use of performance measures. The most frequently used and most effective performance measures were the "softest." Some of the most frequent measures, in order are:

- 1) quality of output/performance
- 2) unit's degree of goal attainment
- 3) amount of work completed on time

- 4) unit's level of efficiency
- 5) percentage of project completions
- 6) percentage of results adopted by the company
- 7) frequency of cost overruns
- 8) number of patents or copyrights
- 9) percentage of project approvals
- 10) number of technical reports
- 11) unit profitability
- 12) number of papers presented
- 13) number of professional honors

These specific measures could be incorporated into an objectives matrix format. DoD activities using gainsharing are listed in the Guide for the Design & Implementation of Productivity Gainsharing Programs (1985), with their measures of performance. All were efficiency-oriented, which measured an output per unit time or per group.

#### 2.5.5 Performance Assessment

Performance assessment can take place at an individual, group, or organizational level. In many organizations, the only way this is tied to rewards is through a performance appraisal, which is almost always at an individual level. Assessment is the process of utilizing information gathered by the performance measurement system, so that the appropriate people can "judge" the level of performance achieved.

Performance assessment is a form of feedback that provides employees with information regarding how well they are doing in their job. This feedback provides information about progress towards goals and performance relative to others (Moltaz, 1984). Feedback can be used to inspire and motivate to use the assessment process as a motivational tool. Feedback that contains competence information is more likely to be motivating, as discussed in Section 2.5.1. Caution needs to be taken because, feedback

that is given in a controlling manner will tend to decrease motivation (Pritchard, 1988). Performance assessment is more effective if done in an improvement-oriented fashion. This applies to group and organizational level feedback, also.

Information exchange is an extremely critical component of an incentive system. The organization's management and the employees are constantly giving feedback to one another to improve. Feedback will also help explain why or why not rewards were given. The more open, effective, and timely the feedback loop, the more success will be obtained in increasing employees' desired behaviors. Lawler (1985) states that an open feedback loop is critical to any successful incentive system.

#### 2.5.6 Reward Distribution

The type and level of reward distribution are critical incentive design issues, along with the distribution mechanics.

##### 2.5.6.1 Distribution Type

Ringham (1982) says the distribution of GS rewards can be: equal, based on hours worked, or amount of pay received. Basing payouts on salary or hours worked, assumes that the more time you work or the more money you make, the more you contributed to the organization. In many cases, this is not a valid assumption. An equal payout scheme is administratively the easiest to implement and execute, but reward sharing becomes an issue. Any payout scheme devised must be beneficial to both the employees and the company. Normally, gainsharing payouts are on a percentage of base pay to avoid wage compression; half the gainsharing systems distribute this way (Ross & Hauck, 1984).

Lazear (1989) explains that pay treatment manifested as wage compression will reduce the disharmony among workers. One major drawback is that the better workers end up being disenchanted by this scheme. He believes that salary and reward compression will

reduce much of the disharmony that will be detrimental to the firm. Salary compression means that as you go up the scale in salary the gap between one level to the next becomes smaller. Reward compression is when you progress to the higher levels of performers, the reward differentials become smaller. Equal or homogeneous reward treatment is frequently articulated as an attempt to preserve worker unity, but reward compression could be effective strategy to focus on higher-level outcomes, such as cooperation. If workers' rewards are based on relative comparisons between employees, the "star" performers will be better motivated, but more friction within the organization could develop (Pinder, 1984).

Rewarding everyone in equal amounts encourages employees to submit input that they would otherwise keep to themselves. It may create some frustration and inequities to those who are working harder and providing submitting more input, but are not being rewarded any more. More experienced workers will have an incentive to reveal their special "tricks" that they have learned, so that the work group will perform better, since they are being rewarded equally based on the group performance (Debettignies, 1989). Thor (1987) believes everyone that contributed should be paid with an equal share and salary levels will take care of supposed seniority and skill differences. Small group incentives recognize that the collective actions of all employees in a group are the most critical ingredient for high performing organizations. In most cases, groups receiving incentives tend to distribute to members equally. Two attributes are required when group incentives are being used, high interdependency and group problem-solving (Nickel & O'Neal, 1989).

#### 2.5.7.2 Distribution Mechanics

When designing a reward system, several administrative issues should be addressed. First the guiding principles of the gainsharing system must be set, so that reward distribution is in support of organizational philosophies. Establishing a reserve fund and pay out caps are a good idea to help smooth out performance fluctuations, so that

employees are not operating at extremes with rewards (Ringham, 1982). Rewards should be paid in separate check, but in the future incentive pay may be such an ingrained part of an organizational culture that it might become a part of the pay check (Kanter, 1987).

When determining the payout formula, consider that a reasonable reward amount should be the result of the formula and normal operating conditions, so that payouts are not too small or too large (Beck, 1992). In many large payouts, the formula is based too heavily on non-labor factors. Ross & Hauck (1984) state that ideal incentives should be about 10-12% of your annual salary. The bonus must be viewed as a cost of doing business by the organization and is normally accounted for as an overhead item. Quality indicators, which impact payouts should also be established to create a quality incentive (Ross, 1984).

Rewarding the contribution of the indirect employees has received increased attention in recent years. Groups such as Public Works functions are extremely difficult to accurately measure their performance and distribute rewards because they only support other work units. Nickel & O'Neal (1989) propose measuring the direct side for overall organizational reward. But since all indirect workers' ultimate purpose is to assist in accomplishing the organization's mission, they also should be rewarded based on the organization's performance. Too often the comparable functions designed to support line functions become very parochial and burdensome, degrading performance instead of improving it. Rewarding these areas as a function of organizational performance might help provide employees with more of a "big-picture" focus and remove some of the "red-tape" which develops in government organizations.

There are different philosophies for incorporating capital investments into the formula (O'Dell & McAdams, 1986). Some organizations adjust for capital productivity, when measuring performance, which compensates for productivity increases due to capital equipment. Thor (1987) believes that capital gains should not be included in the calculation, so the company doesn't have to pay for the equipment twice. The

Productivity School agrees and says that price changes and equipment buys should not benefit the employees' bonus. The "shared fate" school argues that the employees should share in all gains and losses, no matter what the reason.

An inflexible and rigid pay formula is a major contributor to gainsharing failures. There needs to be an evaluation mechanism to review and improve the system. The formula may change as the plan requires (Ost, 1989). Many agree that bonuses for gains in productivity should not be paid out if no profits were made, so gainsharing may need to have some profit-sharing characteristics.

### 2.5.7 Employee Involvement System

Most successful gainsharing systems have an extensive Employee Involvement (EI) system. Without it, the employees will view GS as just another fringe benefit, not ingrained in the organizational culture (Ross, Hatcher, & Adams 1985). EI is viewed by some as the engine that drives gainsharing. During an economic downturn, where payouts are absent, EI is the only thing that will keep productivity improvement alive (Sommerfield, 1990). Employee Involvement consists of a quality-of-work life and productivity focus using all available human resources (Paulsen, 1989). It is a management philosophy that fosters cooperation and collaboration. Keeping employees informed about business plans and giving them influence in the decision-making process is a critical aspect of EI.

The employee involvement structure must be congruent with that of the organization. It must support the GS system and not be in conflict with it in any way. A formal structure is a necessity for fostering and effectively using the employees' inputs. Most EI systems consist of Quality Management Boards (QMBs), which are structured along the organization's structure. QMBs are on-going teams that are designed to foster input from the employees and act on this input. Ad-hoc Performance Action Teams (PATs) are also an excellent EI tool that are used frequently. They are created to solve specific

problems that are identified and then disbanded.

Quality Circles (QCs) are an EI concept that hasn't fit well with the American culture. They are bottom-up and use no rewards. QCs saw a lot of use in the early 80s, only to be abandoned in the early 90s. The major philosophical difference between QCs and the Scanlon Program is the absence of a productivity sharing formula (Schuster & Miller, 1987). Companies desiring a quick improvement in productivity should go the gainsharing route. QCs are normally better suited for cutting material costs. They tend to restrict their workers by focusing only on their immediate work area, whereas gainsharing promotes a more global focus.

In most cases, information sharing increases because formula results are reported very frequently, so the employees are more aware of their organization's performance. O'Dell & McAdams (1986) found that information-sharing among firms with gainsharing was almost double that of non-gainsharing firms.

Some techniques for establishing an EI system are: suggestion system, periodic meetings, work teams, and multiple-tier committees to name a few. This involvement can create increased communication among workers on improving the workplace. EI can also focus externally on changing business trends and how they will effect the way things operate in the organization.

Some of the benefits of EI are that employees will learn about the organization through increased exposure to organizational financial and performance data (Debettignies, 1989). They will also understand how the different elements of the organization effect them and contribute to the overall performance of the organization. EI helps to remove the "us versus them" mentality and replaces it with a shared fate attitude. Experience has shown that once the employee participation begins, it is very difficult to return to the traditional management style (Schuster& Miller, 1987).



### 2.5.8 Individual vs. Group Based Incentives

Individual wage incentive systems are usually applied with manual production-type jobs, based on output generated. Individual rewards from suggestion systems are usually paid as a percentage of savings stemming from the suggestion. Individual rewards provide the most direct link between pay and performance, but group plans provide a higher level of cooperation between workers and also are better suited for accommodating both the direct and indirect workers (PGS Implementor's Handbook, 1990). Spicer (1985) states that cooperation among employees to raise effort levels is more likely when employees expect they will lead to higher rewards.

Ross (1984) believes individual plans should be eliminated before gainsharing can be installed, because they are incongruent. In a study by Tindale & Davis (1985) examining reward allocations by managers, group reward allocations were effected by performance more. The individual reward allocations were influenced more by the individual's need and were subject to more bias. This suggested that group rewards will lend more objectivity, because personalities are removed. Thor (1987) claims that 2/3 of the people are usually willing to switch from an individual plan to a group plan.

### 2.5.9 Line-of-Sight

Gainsharing plans, when implemented with strong group communication and support programs, improve employees' "line-of-sight" regarding what they need to do to improve the organization's results (Hurel, 1991). Gainsharing plans can be implemented in sub-organizational units to increase line of sight further. Bullock and Lawler (1984) state that gainsharing gives employees an increased identity in the organization and Rossler (1992) laid out a five-step methodology for developing a gainsharing system, where the final step in this was to create line-of-sight.

A critical mass must perceive a positive correlation between actions and the bonus, or

gainsharing will be viewed as a lottery. In an organization without inherent line-of-sight, there needs to be formalized participation. A major determinant of employee line-of-sight is the "size" of the organization. Rossler (1991) defines the size of an organization as being comprised of several dimensions, which are the number of: employees, organizational layers, processes, and products, along with the cycle time. All of these issues will influence gainsharing design based on line-of-sight.

## 2.6 Incentive Systems in Use

Since gainsharing is a type of incentive system, it would be helpful to examine its similarities and differences when compared to other incentive systems. Identifying the strong and weak points of other incentive systems will help to construct a more pragmatic gainsharing system.

Rewards in an organization use to fall solely under base pay, and this rate was determined by factors out of the worker's control (i.e., the market value of your skills). Skills that receive high compensation in one organization may receive low compensation in others. Employers are starting to shift their focus towards compensating not only for employee worth, but for their specific contributions (Lawler, 1985). There are many incentive systems that organizations use today to try and influence workers to make more value-adding contributions to the organization.

### 2.6.1 Non-Monetary Rewards vs. Monetary

Monetary rewards focus mainly on employees' extrinsic motivation. Non-monetary rewards are designed to focus on intrinsically motivated behavior, which is defined as effort that is expended in an employee's job to fulfill growth needs such as: achievement, competence, and self-actualization (Pinder, 1984). Relating this to Maslow's Hierarchy of Needs (discussed earlier), intrinsic outcomes relate to higher level needs and extrinsic needs to lower level ones. Sink & Rossler (1988) explain that an organization's

compensation/incentive system will consist of financial and non-financial dimensions. Financial consists of pay, benefits, and monetary incentives. Non-financial factors are components such as: improved work relationships, increased control, resources to perform, and supportive leadership.

The Federal Personnel Manual (FPM 451.6) describes the use of monetary and non-monetary recognition. The available federal awards are discussed in Section 2.2.3. The FPM states that non-monetary incentives offer two major advantages, they help meet the employees' need for recognition, growth and responsibility, and are usually inexpensive.

Performance contingent rewards (based on how well an activity is accomplished), increase intrinsic motivation. This implies that extrinsic rewards, based on performance, can be intrinsically motivating. Task contingent rewards, based on simply completing the task, were found to decrease intrinsic motivation (Earn, 1983). Amabile (1985) found that intrinsic motivation is conducive to creativity and thus, should be promoted in the appropriate situation.

### 2.6.2 Variable Pay

Today's organizations are relying more on variable compensation (Sink, 1989). There is a growing interest in making some form of employees pay variable, based on organizational performance. When wage levels are tied in some degree to financial performance, companies won't have to draw from profits and layoff workers in leaner years (Schuster & Miller, 1987). Thor (1987) states that the major reason for wanting to use GS is to help combat business cycles.

When the company is doing well it is usually willing to reciprocate by passing on raises to its employees. When the organization is not as successful, the organization is stuck with the high-wages of the good old days (Paulsen, 1989). This is the major reason why

variable pay is an excellent way improve your organization's compensation system and longevity.

### 2.6.3 Profit-Sharing

The amount of organizations with full-fledged gainsharing systems is trivial compared to those with profit-sharing (PS) plans. About 9.4 million people are covered by some type of PS arrangements (Kanter, 1987). The reason why gainsharing isn't more widely used is that it entails a large number of hierarchy-rattling organizational changes, unlike profit-sharing which requires much smaller changes. Buhl (1989) states profit-sharing can be formal, paid from a profit-sharing trust fund, or they can be informal, taken directly from business profits. The reason for implementing a profit-sharing plan is more often for improved employee relations and it seems to be more of a strategy to raise employee commitment to the organization.

Profit-sharing is a way to tie compensation to the performance of the organization. This is an excellent way of reducing fixed costs, which are especially important for newer companies. Firms using a system like this would have an incentive to create jobs because additional employees are paid only in proportion to what the company brings in (Buhl, 1988). The major flaw with profit-sharing is the individual pay-to-performance link is weak. The employee doesn't receive any rewards as a result of specific behaviors they have displayed. Profit-sharing can be classified as a group contingency plan (Geller, 1987), where an individual's reward is based on the performance of a very large group.

### 2.6.4 Bonuses

Bonus programs operate from pools of money that are provided to senior managers, so they can recognize employees who have made significant contributions. Under the typical bonus plan, a discretionary payment is made without specific award criteria being

communicated in advance (Rowland and Greene, 1987). There is a great deal of flexibility in a bonus system because there are no formalized performance criteria. For instance, managers can emphasize goals based on short-term needs. There seems to be a lot of employee dissent with bonus programs because of the subjectivity involved. Some bonus programs (especially Christmas bonuses) operate just like profit-sharing plans, where equal or equitable bonuses are given to most employees, if profits increase. Bonuses are viewed as a reward for extra effort and not an extension of the wage structure. Also the less standardized the work, the greater the opportunity to work smarter and the greater need to recognize those individuals who rise as stars using bonuses.

D'Camp & Ferracone (1989) talks about a concept called spot gainsharing. The goal of spot gainsharing is to produce peak performance from participants during a specified time period. Goals are established, and if they are met, bonuses are given. Then the system is deactivated. Goal setting using spot gainsharing can reflect an organization's unique and temporary needs more than traditional plans. An organization could even choose to have spot gainsharing serve as a pilot for wide-spread gainsharing.

#### 2.6.5 Merit Pay

Merit pay is set up where a worker receives base pay determined by the market, with increases in their base pay determined by judgements about their performance. Kanter (1987) explains how merit pay builds on and preserves the status distinctions in an organization by enhancing the power of superiors over subordinates. This is a permanent pay adjustment as opposed to an actual bonus. This could be disruptive to the organization. There is also the problem when supervisors are reluctant to single out high performers because they don't want the discomfort of defending differential treatment. Singling out individual contributions from a joint output can pit group members against one another when competing for scarce rewards. Naff (1988) did a study of federal managers that were paid from a merit pool under a system based on individual

accomplishments. These federal managers did not appear to be more highly motivated with merit pay than under the normal time in grade compensation policies.

#### 2.6.6 Piecework Plans

Piecework plans are based directly on individual contributions. One will get a certain monetary compensation based on the objective output that they produce. A common example of piecework is the commissions paid in the sales field based on number of units sold or revenue generated. Piece-work plans tend to attract risk-oriented people. The biggest disadvantage of these plans are that they reduce management control over the worker. If a worker is compensated through commissions on selling widgets, they will do little else (Rowland and Greene, 1987). Some other disadvantages of piece-work plans may be quality control and safety infractions.

#### 2.6.7 Pay for Knowledge and Skill

Pay for skill or knowledge is where workers are compensated based on how many skills they have acquired or how much knowledge they have attained. A new worker can develop a plan for expanding his or her skill base, so they may become a full team member by progressing through standard "skill blocks" (Kanter, 1987). Their base pay is then raised, accordingly. The major drawback of pay for skill is the "topping out" effect that Lawler (1985) talks about. This happens when all skills are acquired and the rate of pay increase is dramatically reduced.

#### 2.6.8 Entrepreneurism Pay

Entrepreneurism pay is a fairly new concept that attempts to transform employees into "owners" of a piece of the company. An employee can earn a return on their success, which will increase a worker's commitment and concern to the organization. It has been a problem, especially in R & D companies, on how to fairly compensate those whose

efforts produce new and extremely profitable technologies or products. Some people are motivated solely by intrinsic rewards, feeling rewarded through recognition and the satisfaction of inventing something new. Singling people out and rewarding them as the "originators" of an idea, may encourage people to hold their ideas until the time is best to earn the biggest reward, though.

## 2.7 Applicable System Development Methodologies

This section will outline accepted methodologies for developing a GS system and for undertaking a general research effort.

### 2.7.1 Gainsharing Design Methodologies

There are numerous methodologies and guidelines that could be followed when designing a Gainsharing system. Two methodologies that are generally accepted by the DoD will be examined in this section, along with other supporting literature.

The Guide for the Design and Implementation of Productivity Gain Sharing Programs (DODINST 5010.31G) was published in 1985. It outlined a generally accepted methodology for the design, development, implementation, and evaluation of PGS systems in the Department of Defense. The Office of Personnel Management (OPM) modified the DoD's methodology based on further experience with PGS. The PGS Implementor's Workbook outlined another methodology for the design, development, and implementation of PGS systems. The information from these two guides, along with from several journal articles are integrated and organized into five basic steps: assessment, design, development, implementation, and evaluation of gainsharing systems.

#### 2.7.1.1 Assessment

Ringham (1982) states the first thing you need to do when attempting to implement GS

is to define the objectives of the plan and what you hope to gain. An organization will normally appoint a gainsharing coordinator to be the "owner" of the system. Next, form an assessment team consisting of a cross-section of the organization and key interest groups. To prepare for gainsharing assessment and design, this team will: attend seminars, read relevant gainsharing literature, speak with consultants, and visit organizations with gainsharing experience (O'Dell, 1984). She feels that in this stage a cost-benefit analysis should be performed to determine whether gainsharing will be worth the effort.

The first major activity will be to conduct a Feasibility Study, which includes: determining top-management's attitudes, management-employee relations, productivity measures, and cost/benefit. This information can be gathered through: surveys, management interviews and reviewing organizational operations and processes.

The gainsharing system can be put in place to lead or to lag an organizational change effort (Lawler, 1985). He states that participation in the design may lead to better understanding, commitment, and a better final product. When assessing GS feasibility, part of the organization may be used as a pilot project. In this stage, the decision could very easily be to scrap the effort.

Ross & Hauck (1984) lists favorable conditions for gainsharing.

- top management commitment
- adequate planning and employee education
- adequate base wages and fringe benefits
- good labor relations
- realistic expectations
- middle-management and foreman support
- properly designed and simple formula
- accurate and available accounting and production data



- heavy emphasis on communications
- aggressive marketing to absorb increased production/support
- absence of major threat to job security

### 2.7.1.2 Design

If the decision is made to proceed with GS, a plan will need to be developed. It will outline a basic design of the system. The plan must have the organization's mission statement, major products and processes, and customers. Major initiatives from the Strategic Business Plan impacting gainsharing should be included in the plan, along with an explanation of GS and the rationale for using it. The goals of the gainsharing system will be outlined, which should be consistent with organizational goals. The results of the assessment study, conducted in the previous step, should feed into the development of the GS plan. All key stakeholders should be involved in the plan's development. The GS plan will educate the organization's sponsoring activity and help gain approval in DoD applications.

The DoD Guide explains that there are 6 participant entities which will be involved in the design of a GS system. These are: program coordinator, steering committee, facility management, first level supervision, local union, and workers. The union plays an important role with gainsharing success. It can be a major benefactor by raising their visibility with the majority of non-participating union members by playing a role in their bonus checks (Ross, Hatcher, & Adams, 1985). All of these entities should be represented on your GS design team and implementation team. A steering committee, usually consisting of top-management, will provide authorization for all gainsharing activities.

O'Dell (1984) feels that it is usually advantageous to use consultants and that they should be conferred with early. She feels that the design team should be comprised of a cross-section of the organization. It will usually take the team six months to a year to

design the gainsharing system with a team. Markham & Scott (1988) recommend that a formal position should be established to direct and manage all GS activities.

Rossler (1991) recommended several activities for designing a gainsharing system.

- 1) build a causal model to understand the organization
- 2) address operational and administrative levels
- 3) set performance goals based on system capabilities
- 4) set bonus payment levels
- 5) create line-of sight

Some critical issues for a gainsharing design are: ensuring equity and integrating gainsharing with other management systems (Sink & Rossler, 1988). Additional design activities are:

- develop performance measures
- establish GS pay sharing features
- design GS distribution mechanisms
- design performance feedback mechanisms
- define program evaluation criteria
- determine program schedule

### 2.7.1.3 Development

Involving the union in all stages of development is highly recommended. Management, especially middle management, is another key group to involve because they may also oppose the plan for fear of losing power. The system will need to be marketed very vigorously to gain the required commitment.

The GS system will be integrated with existing incentive systems and personnel and

financial policies. Thor (1987) states gainsharing must be integrated with all other organizational improvement initiatives. At this point, begin to communicate the formula details to the employees, which will raise awareness and interest. It is suggested to start the system when the business cycle is rising, to provide an initial success in the employee's eyes. Before program implementation begins one will need to: conduct a communications audit, train supervisors in participative management skills, establish labor management committees, and brainstorm potential weaknesses in the program (Hammerstone, 1985). Some additional development activities are:

- establish and validate performance measurement standards
- construct and install necessary performance measurement and reward calculation mechanisms
- install incentive payout mechanisms
- prepare orientation and training materials

#### 2.7.1.4 Implementation

An implementation plan of action is needed to provide structure and direction to all implementation activities. The GS implementation team should be made up of a cross-section of the organization, although not as many key stakeholders are required as with the design team. In most cases, the design team will transition into the implementation team. Members can be brought on board and dropped throughout implementation. The implementation team is responsible to secure and sequence all resources required. The Implementation Plan should be as detailed as possible, showing contingency plans to prepare for the unexpected. Training plans will also be outlined in the implementation plan and become more focused as the implementation continues and specific training needs are better known. There are changes in communication and leadership patterns that will need to occur when implementing gainsharing.

The GS plan itself should be introduced to the entire work force in this phase. Tell them

the benefits of GS and exactly how it will be used in your organization. Explain the process used to develop the plan to the employees, and how they will be affected by it. Finally, present the Implementation Plan to all employees so they will know the time-frame for all GS activities. This will help increase their trust and commitment to the plan.

Establishing an Employee Involvement (EI) structure and how it will be modified must happen early in the design process. This will be described to employees during implementation. If a suggestion system is adopted, suggestions should be tracked and the suggestor informed of its status. EI Team meetings will be coordinated and tracked. You may even decide to conduct a "trial run" of the gainsharing system in the implementation phase.

#### 2.7.1.5 Evaluation

Evaluate the GS system against its goals, the pay outs, and the evaluation criteria, which are laid out in the GS plan. Gather data on: involvement, communication, commitment, and performance gains and deliver supplemental education as required. Surveys may be used to assess employee attitudes towards GS. An evaluation team may be established to determine the intended and unintended outcomes of GS on the organization. This team may grow from the implementation team. An Evaluation Plan will be constructed outlining the approach to: data collection, analysis, and action. Also evaluate the processes used to develop and implement the system (lessons learned). The program will be modified as needed. The evaluation of GS may indicate the need to forego any further gainsharing activities in the organization.

Hatcher & Ross (1985) state you can "stir" the GS pot by: conducting continual training, initiating programs for better communication, setting goals for departments, having periodic reviews of the bonus formula, and holding annual evaluation reviews.

### 2.7.2 Research Design

Any research effort must be carefully planned and executed. My gainsharing effort entails: gathering information, gaining knowledge, and systematically applying it to developing a general gainsharing model. Leedy (1985) outlines the basic research process that all research efforts should follow.

- a need for the effort arises
- a problem statement is developed
- appropriate sub-problems are developed
- tentative solutions are defined
- collect supporting data and organize it
- analyze the data to arrive at a solution

All research efforts need to have carefully selected objectives and these efforts must be approached in a systematic and well thought through manner. This thesis, develops a tentative solution in terms of a gainsharing model, then improves upon it through massive data collection and analysis. The goal of any research project is to ultimately contribute to the realm of human knowledge. Leedy (1985) identifies seven characteristics of research:

- 1) must have a purpose
- 2) should be clearly stated
- 3) must be planned
- 4) divide the purpose into manageable objectives
- 5) based on assumptions
- 6) interpret facts, not just describe them
- 7) is a process

This research methodology satisfies all of Leedy's criteria. The next issue is how to

select and develop a methodology. Yin (1987) gives us criteria for selecting a research method. These are:

- nature of the research purpose
- degree of control the researcher has over events
- focus on past or present events
- data available

Based on the literature reviewed, the research methodology undertaken seems to be a modified action research method. Action research is one of many research methodologies that can be adopted. Rapoport (1970) says action research aims to contribute to both the practical concerns of people in an immediate problematic situation, and to the goals of social science by joint collaboration within a mutually acceptable framework. Chein (1946) describes what he calls Empirical Action Research, where the researcher is involved in the diagnosis and planning of the action to be taken. This is exactly what was accomplished in this thesis effort. Sussman and Evered (1980) state that organizations can be legitimate objects of scientific inquiry only as single cases, which is the bounds of this thesis. The knowledge needed for problem-solving needs not be derived by reference to a general category and the results don't have to be generalizable. Lawler (1985) feels that with regards to the design of gainsharing systems, practice has lead theory. He feels that social innovators tend to structure gainsharing programs and then leave the theoreticians to understand why things happened.

Leedy (1985) explains that your research project should be broken into sub-problems that can stand alone. The purpose of these sub-problems are to divide the main problem in manageable sections. Below are some research characteristics of sub-problems.

- they should be a completely researchable unit.
- within each sub-problem interpretation of data should be apparent.
- the sub-problems should add up to the total problem.

The research questions are in fact sub-problems and solve the above criteria.

## 2.8 Supporting NAWCADTRN Information

It is important to have a full understanding of relevant organizational variables and relationships, before attempting to design a gainsharing system. Rossler (1992) felt that most gainsharing studies were correlational and take a "black box" view of gainsharing and organizational performance, instead of integrating organizational functions into the gainsharing system. The Naval Air Warfare Center Aircraft Division, Trenton's (NAWCADTRN) "inner-workings" will be investigated in this section to provide a familiarity with the cultural, political, and financial environment. NAWCADTRN is to close in 1998, due to recent BRAC law. Almost all of the data for this thesis was gathered prior to the announcement of the closure. Thus it is felt, this is still valid data for a successful RDT&E facility. Gainsharing will not occur at NAWCADTRN, but could very easily be established in a similar organization.

NAWCADTRN is a service-oriented organization. Hauck (1982) classifies a service industry as one in which outputs can not be easily stored and there normally needs to be a direct interaction between an employee and the customer. NAWCADTRN is also a public-sector organization, which is funded through the tax base. Public organizations in the U.S. seem to be organized around the efficiency paradigm rather than the quality paradigm and tend to meet minimum, not optimum standards (Gilbert & Nelson, 1988). Public workers are generally bound by rigid bureaucratic rules and job classification systems and employees are generally not consulted as full partners in their organization. They have limited involvement in tactical planning and have no meaningful partnership with management in the problem-solving process (Dulworth & Usilaner, 1987).

It is critical to understand NAWCADTRN's "special" characteristics to get initial feedback on GS feasibility for a government, RDT&E organization. General information about NAWCADTRN's structure and work load, along with understanding how

NAWCADTRN secures its funding is important to determine possible funding sources for GS. Having an understanding into areas such as: NAWCADTRN's relations with their customers, performance measurement, and existing incentives is critical. Several NAWCADTRN documents were consulted along with several managers to gather their perceptions relative to the above issues. When referencing these people, their initials will be used. The following NAWCADTRN managers provided some of this critical preliminary information.

- Martin Dell (MD), Head of Operations and Plant Engineering
- Jeorge Matos (JM), Planning and Budgeting Office
- Kenneth McCauley (KM), Budget Officer
- Lawrence Palcza (LP), Head of Corporate Management
- Bernard Seighman (BS), Supervisory Planner and Estimator
- LCDR Michael Simchich (MSi), Head of Supply
- CDR Michael Stichter (MSt), Head of Propulsion Engineering
- Keith Wallick (KW), Comptroller

### 2.8.1 NAWCADTRN Characteristics

All information for this section was taken from the NAPC Organizational Manual (NAPCINST 5451.1). The Naval Air Warfare Center Aircraft Division, Trenton, formerly the Naval Air Propulsion Center (NAPC), located in Trenton, NJ is one of the world's premier facilities for the research, development, test, and evaluation of air-breathing propulsion systems. NAWCADTRN is one of the Major Range and Test Facility Base (MRTFB) activities under the Naval Air Systems Command, Deputy Assistant Commander for Navy Ranges and Field Activity Management (NAVAIR-42). Under the MRTFB arrangement, NAWCADTRN receives funds authorized by congress to cover the cost of overhead functions/activities.

NAWCADTRN has an extremely unique work force mix. There are approximately 750



employees in the organization, of which 1/3 are engineers and scientists. There is a mix of blue-collar and white-collar employees. NAWCADTRN is program driven and is structured as a matrix organization to support both programmatic (direct) and administrative and support (indirect) functions. This complex interaction between department personnel, along with the type of work performed, makes it extremely difficult to accurately track NAWCADTRN performance as is the case with most government, RDT&E facilities. The results of RDT&E tasks/projects are hard to track and measure. The work is a very cyclic function having a job shop type of environment, which makes it very hard to develop standards for.

There are 10 departments within NAWCADTRN, which are explained briefly below. These descriptions were taken from the "NAWCADTRN Command Brief."

- 1) Staff (00)- This is the Commanding Officer's, Executive Officer's, and Technical Director's Offices, along with their support staff.
- 2) Comptroller (CR)- Responsible for all Center accounting and budgeting activities.
- 3) Supply (SU)- Orders all equipment and materials and authorizes all contracting.
- 4) Security (SE)- Assures that the integrity of all Center functions are guarded.
- 5) Civilian Personnel (CP)- Charged with all hirings, training, and personnel data management.
- 6) Public Works (PW)- Performs all maintenance functions for the Center.
- 7) Operations and Plant Engineering (OP)- Provide engineering support functions for all test activities.
- 8) Information Systems (IS)- Responsible for all computer systems and test cell instrumentation.
- 9) Systems Development and Evaluation (PE2)- Manage all engine test programs.
- 10) Science and Technology (PE3)- Manage all research and development for engines and associated systems.

NAWCADTRN operates under Navy Improvement Fund (NIF) accounting procedures (KM). All labor must be authorized by the customer and will be done under a direct or indirect labor capacity. The labor is authorized at an accelerated rate, which includes leave and benefit contributions. Direct work is billed directly to a specific program and indirect is billed to MRTFB funds. Underruns are returned to the customer. Overruns affect the Center's operating results and must be covered via increased labor rates the following year (NIF Accounting Procedures, Ch 9). Since MRTFB funds are becoming more scarce, marginal or "gray" areas previously charged to indirect are increasingly being charged to direct customers. Based on the MRTFB Installation Summary of May 1988, the direct to indirect ratio is estimated to be about 60%. This means that MRTFB funding is about 40% of total NAWCADTRN funding.

Since NAWCADTRN receives MRTFB funding, sponsors are not charged an overhead rate for their programs. The intent is to attract military customers to perform T&E work, thus keeping facility usage high. NIF guidelines provide for the allocation of indirect costs equitably across all programmatic functions (NIF Accounting Procedures, Ch 5.). NAWCADTRN does this, in the case of their newly enacted computer usage fee, which is attached as a percentage of all direct programs. This is the only indirect charge attached to direct work. There is a Work Unit Assignment (WUA) Number created for the funds accrued by each direct program (CR Memo of 27 Sep 90). This WUA is managed by the IS Department to improve NAWCADTRN's computer systems. This example demonstrates the opportunity to impose an indirect charge on programs/projects and invest the money that is accumulated as NAWCADTRN deems to be in the best interest of the organization.

### 2.8.2 Existing Incentives

The present NAWCADTRN awards system operates with a pot equivalent to 1% of the total payroll, which comes out of MRTFB funds (KW). The NAWCADTRN FY90 payroll budget was about \$25M, so the award budget is \$250K. This averages out to

about \$300 a person, per year (KW). These awards can either be given as Sustained Performance or Special Act awards. The present individual award system is perceived by the employees as being very subjective.

NAWCADTRN also operates a Quality Suggestion Program (QSP) in addition to the awards system, which is designed to recognize employees or groups of employees for ideas that benefit the Center and Navy through improvement suggestions, ultimately leading to more effective operations (NAPCINST 5000.2, 1990). The second level supervisor has the authority to approve QSP awards up to \$1,000. The belief is that the QSP helps facilitate the process of change by providing another communication means with line management.

There are 6 Navy, 10 DoD, and 3 Presidential awards that can be issued to federal employees for superior performance that NAWCADTRN has the authority to utilize. Publication awards of up to \$200 can be distributed to those employees that publish papers. Merit increases in pay may be granted to those employees identified as achieving sustained, long-term, superior performance. All of these awards are used sparingly at NAWCADTRN.

NAWCADTRN is required to submit a Performance Management Plan to OPM, as are most government agencies. This plan describes an agency's methods to integrate pay and awards with basic management functions for the purpose of improving individual and organizational effectiveness to the accomplishment the agency's mission and goals (FAR Part 451).

The Commanding Officer at NAWCADTRN is obliged to have the most effective incentive system that can be achieved with the available resources. According to NAVAIRINST 5305.1C, Activity Heads are responsible for:

- 1) developing and implementing incentive awards program

- 2) supporting awards programs to improve productivity and job performance
- 3) ensuring adequate funds are available for awards
- 4) conducting an annual review of the awards program
- 5) naming an incentive administrator

### 2.8.3 Existing Employee Involvement

NAWCADTRN has become increasingly active in their practice of employee involvement. There are three major areas where Employee Involvement (EI) efforts are focused. These are:

- 1) TQM Process Improvement
- 2) Key Results Areas of the Strategic Business Plan
- 3) Safety Deficiencies Identified by the Navy IG

#### 2.8.3.1 TQM Process Improvement

In early 1990, NAWCADTRN initiated widespread training to educate their workforce on TQM tools and techniques. This helped to greatly increase the visibility of the TQM program. An Employee Involvement structure was dictated by NAPCINST 5000.1A, which outlined the following functions.

- 1) TQM Coordinator- Will administer/coordinate TQM/EI initiatives within the Center.
- 2) Quality Management Boards (QMBs)- Composed of department heads (chairman), selected departmental managers, and union representatives. They will establish TQM policy within their departments and administer departmental PATs.
- 3) PATs- Knowledgeable employees, working in teams and following prescribed procedures, will improve processes at either a Center level (inter-departmental) or departmental (intra-departmental).

- 4) Work Group Improvement Teams (WGIT)- Division/branch teams will be formed to improve work processes in their areas.
- 5) Quality Advisors (QAs)- Trainers and advisors appointed and trained to support QMBs, PATs, and WGITs.

To further instill the Center-wide TQM training, many WGITs were formed in all divisions to address specific problems that were identified as inhibiting divisional performance. Some teams were in existence for very short durations and others are still in existence. The teams worked through their immediate supervisors and received authorization for implementation from upper management. Some departments have very active WGIT participation and others have minimal. Overall, many good things are being accomplished by these teams. But unfortunately, since NAWCADTRN appeared on the base closure list and is slated to close in the next few years, team participation has dropped dramatically.

There were 8 Center PATs (CPATs) that were formed by top-management to address specific processes, identified as needing improvement. Employees from throughout NAWCADTRN were appointed to these teams, which addressed a broad range of areas.

Many intra-departmental PATs and WGITs were formed to address problems existing within their respective departments. Some examples of the issues that these PATs have worked on are: New Employee Orientation (CP) and Tool Crib Logistics (PW). QMBs were established in every department to provide guidance to the intra-departmental teams. The TQM Council acts as the QMB for all the inter-departmental PATs.

#### 2.8.3.2 Key Results Areas of the Strategic Business Plan

NAWCADTRN top management drafts/updates a 5-year Strategic Business Plan (SBP) every couple of years to define NAWCADTRN's long-term vision and lays out the strategies to get there. The plan is organized into what are called "Key Result Areas"

(KRAs) and goals and objectives are developed for each of these areas. There is a team formed (consisting of 7-9 members from throughout the Center) to address each of the 6 KRAs. These are:

- 1) Total Quality Management
- 2) Maintain and Modernize our Facilities
- 3) Center Workload
- 4) Effective Business Practices
- 5) Motivated and Highly-Qualified Workforce
- 6) Enhanced Technical Competence

When the SBP is updated; the KRAs may be modified slightly and the goals and objectives supporting them may be revised. The make-up of the teams may also change periodically as objectives are revised. These teams meet on a regular basis to develop strategies for addressing their objectives and to monitor progress. Several times a year, each team briefs the Strategic Management Team (SMT) on their accomplishments and future plans. The SMT authorizes all KRA efforts.

#### 2.8.3.3 Safety Deficiencies Identified by the Navy IG

A Navy Inspector General (IG) Team visited NAWCADTRN in December 1990 to conduct an audit of operations; one of the areas they examined was safety. They uncovered 118 significant safety discrepancies, which had to be corrected within 1 year.

A Safety Quality Management Board (QMB) was formed with the ongoing responsibility to correct these discrepancies. The QMB established a Primary Safety Process Action Team (PAT) to develop a course of action to correct these IG deficiencies. The PAT categorized the 118 items into 27 groups and formed 16 teams to address the groups. Team members were selected by the Safety PAT and the team leaders met with the PAT for an initial kick-off meeting in late February of 1991. The 16 teams provided bi-

weekly progress reports to the Primary PAT and the PAT provided a bi-monthly report to the Safety QMB. The primary PAT leader met with the Safety QMB leader twice a month and the QMB leader met with the Executive Officer (XO) once a month to inform of progress. The Safety QMB tracks the progress of the 16 PAT teams via the Primary PAT and approves all recommendations. The goal was that after the immediate deficiencies were corrected the teams would look at long term process problems and devise solutions. This has occurred for the most part. The Naval Air Systems Command has been extremely pleased with NAWCADTRN's innovative approach to confronting this immediate situation and is using NAWCADTRN as a model for employee involvement and safety improvements.

#### 2.8.4 Funding and Budgeting at NAWCADTRN

To define a specific gainsharing model for NAWCADTRN, it was necessary to understand the flow of money into the Center and how it was spent once on-board. In addition to the initial interviews, several presentations that described NAWCADTRN's funding process were reviewed. These sources helped provide a basic understanding of how funding is secured and the surrounding political issues impacting funding. GS will be strongly impacted by any government, RDT&E organization's funding process.

##### 2.8.4.1 Direct Funding

There are two ways to get direct customer funding: 1) reimbursable funds from government agencies and 2) money from private companies. This funding is requested, budgeted for, received, then spent. NAWCADTRN government customers don't pay overhead for their services because MRTFB funding (explained in Section 2.8.1) pays for these expenses. In FY92, NAWCADTRN "marketed" 935 total man-years of labor, when they only had 760 people working here (23% too high). With the unpredictability of engine testing, NAWCADTRN always requests more work than can be completed.

The validity of a program's budget estimate is not usually questioned by the customer of direct programs. The only performance tracking device now used is financial tracking of actual vs. the planned expenditures. In many cases, not spending all of your budget does not necessarily mean there are savings because part of a program could have been delayed or canceled. In particular, developmental programs are susceptible to first-time unexpected errors that impact schedule and budget, thus making it harder to develop an accurate budget and assess real savings.

#### 2.8.4.2 Indirect Funding

NAWCADTRN's indirect funding comes from the Navy Major Range Test Facility/Base (MRTFB) account supplied by NAVAIR. This funding is given to NAWCADTRN in a flat amount to cover Maintenance & Repair (M&R), Improvement and Modernization (I&M), and Operational Security (OPSEC) costs. Like "base keeping" funds at other Navy establishments, this funding is barely sufficient to maintain critical overhead needs (MD). Because indirect funding is in short supply, NAWCADTRN attempts to minimize indirect labor by sometimes charging it to direct accounts (LP). This leaves more money to spend on maintenance and facility improvements for NAWCADTRN.

There are many variables that impact the decision whether to contract work out or to perform work with in-house indirect labor. Public Works projects over \$25K are usually contracted out. When time is a critical factor, the work is performed using in-house labor, though sometimes more expensive (BS). There are also hidden costs to be considered when contracting out (i.e., proposal processing, investigating). It is much simpler to do the work in-house, so some projects may be done with in-house labor because it is much more convenient than contracting out.

#### 2.8.4.3 Possible Gainsharing Sources

It is critical to understand the funding process, to identify possible sources of GS money.



The NAWCADTRN funding process is basically as follows, as explained by Larry Palcza.

- direct program managers estimate the labor and other costs to run their programs
- indirect managers estimate the labor costs and costs to operate, maintain, and improve the Center
- direct programs get approved and funded
- indirect managers get MRTFB funding
- services are provided and charges are made to the appropriate direct and indirect funds
- money is left over because of savings and unprovided services or there is a shortfall because of cost overruns

Based on this process, it seems that a macro-level measure could be assigned to determine savings. It is not as simple, as was alluded to earlier in this section. There are many constraints that may impinge upon NAWCADTRN's ability to carry out an effective GS system. Keith Wallick feels that a gainsharing system must focus only on the reimbursable funds, which are direct funds for in-house work. The life of money and how to carry over this money is a logistical and policy issue that would have to be addressed (KM). Most funds authorized by congress must be spent in 1-2 years.

Martin Dell states that GS must be funded solely by proven savings (either direct or indirect). When there are savings, a program manager must consult with their sponsor to gain permission to distribute this money for GS. If savings aren't "real," sponsors will be afraid that payouts will be distributed when no money is actually saved (MD). In many cases, it is extremely difficult to prove savings without an accepted measurement system.

When NAWCADTRN seeks funding for labor, they budget for regular labor and for

overtime (OT) labor. The overtime labor is a slack resource to cover unforeseen problems or meet critical schedules. CDR Michael Stichter believes the savings NAWCADTRN realizes due to non-use of its OT labor funding can be used for GS distributions. Workers will have to realize that this is a short-term plan and that OT is not a right, it's a circumstance of doing business. Some workers depend on a certain amount of OT and will not be happy getting a bonus check at the end of the year for \$400, instead of earning \$2000 or more for working OT.

The Commercial Activities Program (CAP) could have an influence on the GS system. The CAP involves doing Most Efficient Organization (MEO) Studies, which is an analysis of an activity's functions to determine whether work could be performed in-house or contracted out (MSi). All government industrial facilities are required to perform this study. If NAWCADTRN proves they are more cost efficient than the private-sector, they are saving the government money and should be rewarded for this in some way. This reward may be distributed to all employees that end up working on that project. It is difficult and very time consuming to do an MEO study of every function each year. NAWCADTRN rotates the functions to be studied every 5 years (MSi). During the five year cycle, the Statement of Work (SOW) is modified for contracted-out functions. Contracting out does save MTP dollars, because billets are saved that can be applied to other areas. There is a controversy whether to increase MTP dollars if work is performed in-house. If MTP dollars are not raised for winning in-house work, the organization has a disincentive to improve and be competitive with the private-sector. It is generally felt that MTP limits should be increased in these situations because the activity shouldn't be punished for saving money.

When NAWCADTRN contracts out, the contractor charges approximately 10-20% for overhead and 6-10% profit. For in-house work, an estimate of labor and materials is made, then 40% overhead is added to the labor figure (BS). Any money left over from a project goes back into the MRTFB fund to be spent on something else. Direct projects are prohibited from charging this type of overhead, which seems somewhat inconsistent.

### 2.8.5 NAWCADTRN Relations With Sponsors

If a sponsor saw money for gainsharing payouts taken out of the funds he sent, he may desire to take some back, especially if there is a shortage of money in other areas that the sponsor is funding (LP). Real dollars look a lot different to a sponsor than percentages of funding. If the Navy required a percentage of labor costs taken out for GS there would be no problem getting sponsors to comply. Presently this is not the case, so each sponsors must individually buy-off on any GS design.

Since there are no standards for setting the cost of many projects, Program Managers could inflate their budgets to increase savings. As a result they would create larger savings. If the GS funds were attained based on a percentage of funds saved, the PM could contribute to a higher GS bonus by inflating his budget. But, in a group reward system the direct incentive for a PM to inflate figures is removed because any savings due to overcharges will be diluted when distributed throughout NAWCADTRN. PMs would have to share their program's savings with the entire Center, thus diluting their ability to directly influence the size of their own gainsharing bonus. If MTP dollars were saved through productivity increases, the organization could petition the major claimant for a gainsharing distribution, or to hire more people to spend this excess money (MSi).

### 2.8.6 Measuring NAWCADTRN's Performance

Customers are one of the best measures of performance and NAWCADTRN tries tap this information source through a Customer Satisfaction Survey (CSS), which is distributed to all NAWCADTRN customers. There was an attempt to place a weighting system on the CSS, based on dollar value of contracts. The weighting system was dropped because NAWCADTRN management thought it would cause the smaller valued programs to be ignored (LP).

NAWCADTRN's lack of competitors has hindered the development of valid performance

measures. Competitive bidding is a good mechanism to promote valid budgets, thus helping to ensure "real" savings. NAWCADTRN can't even benchmark against Arnold Engine Development Center (AEDC), because their costs are much higher than NAWCADTRN's cost to test engines (LP). AEDC is an Air Force Engine Test Facility and is the organization most similar to NAWCADTRN. The GAO showed a 40% lower cost for per engine test hour compared to AEDC in 1990. Ironically, because of the base closure, AEDC will absorb much of the testing now performed by NAWCADTRN.

After attending a DoN sponsored GS seminar in December 1989, Marty Dell concluded the major problem is that there is no clear cut agreement on the specific outputs of NAWCADTRN. This makes it difficult to develop measures. It is unknown at this time, what should be measured to give a sense of how their business is doing. He felt it was necessary to set performance standards based on at least a three year period to determine whether NAWCADTRN has improved, which is consistent with OPM recommendations.

#### 2.8.7 Distribution of Gainsharing Funds

If there is money for GS, the Corporate Management Office will want the money to be invested into M&R and I&M, because of the funding shortages in these areas, instead of giving it to the employees. With a 50/50 split of savings with employees, half the GS money could go to these areas. One major distribution problem is that NAWCADTRN has been operating at a loss for the last couple years. Labor rates are about \$1.50/hr too low and management is reluctant to raise the rates because they want to give sponsors as low a rate as possible (KM). This will adversely effect the size of GS payouts. If there were losses, there wouldn't be any payouts due to a management decision.

Keith Wallick believes there should be a separate GS system for each function or work area. He thinks GS should start small and gradually spread throughout the organization. To start the system, he recommends using the existing incentive pot for GS in

conjunction with existing performance measures. The funding source could be modified as the system expands.

The Commanding Officer formed a PAT team to investigate group incentives. Improving incentives is an objective in NAWCADTRN's Strategic Plan. This team looked at the awards records for three years (1988-1990). There seemed to be bias in award allocation between the supervisory/management and non-management and also between departments. Employees had voiced this concern prior to the results of this investigation. Distribution rationale for incentives will need to be more visible and clear, so that no distrust and perceived bias develops.

Marty Dell raised the point that some sponsors may agree to using savings for GS, but they may want the money to go solely to the people working on the program. This is a valid point, but I believe this may create a conflict of interest between sponsors and program managers. If sponsors have control over money that is going into NAWCADTRN workers' pockets, they may expect special treatment. Also, there are some programs that will never produce measurable savings, such as Training. The people working on these programs will have no incentive to try to improve.

## 2.9 General Model for Gainsharing

Based on the initial data review, five major design parameters (including integration), for a gainsharing system were identified. This section outlines these design parameters, along with the attributes and options for each parameter. Some of the parameters have sub-attributes and sub-options. Figure 2.4, at the end of this section, depicts a model of the relations between gainsharing parameters, attributes, and options. A gainsharing (GS) Design Team could use this model to define which design options are best for their particular organization. In the case of this effort, a system for a government, Research and Development, Test and Evaluation (RDT&E) facility, like the Naval Air Warfare Center Aircraft Division, Trenton (NAWCADTRN) is being defined. The general

gainsharing parameters that have been identified are as follows:

- 1) Funding Source
- 2) Distribution
- 3) Performance Measurement
- 4) Employee Involvement
- 5) Integration

### 2.9.1 Funding Source

Securing a pot of money to supply the gainsharing system is a necessity. Without enough "revenue" to supply the GS system, it will lose impact and will be doomed to fail from the start. If the gainsharing system possesses a lack of monetary clout, employees will perceive that management places a low priority on it. The first, and possibly most complex, design criteria is developing an approved method of securing the funds to supply the GS system.

This design parameter requires the designer to answer a simple economic question, "how can we generate enough revenue to drive our GS system?" All potential money sources need to be identified and considered. Based on the data collected, four basic options were identified.

#### 2.9.1.1 Savings

The traditional method of getting money for a gainsharing system is through actual dollars saved. This method is very popular because this number is easy to quantify and prove. Savings are accrued when the organization spends or budgeted less money in pre-specified areas than it has in the past. They normally stem from savings on particular programs/projects or savings in labor costs.

Savings can accumulate with either direct funds or indirect funds. In NAWCADTRN's case, direct funds are provided to meet a specific customer requirement and indirect funding supports the overhead operations. Savings can also occur in overtime labor, if all this money is not spent. In many organizations, management allots a certain amount of indirect funding towards overtime labor. Savings will be deposited in a GS fund when they accrue, but in cases where losses occur, funds should be withdrawn to cover the losses. Any profit above a designed level could also be considered savings, or in the case of a government, RDT&E facility, having a positive Net Operating Result (NOR).

Money would accrue in an organization like NAWCADTRN using this method in the following manner:

- each program/function is allotted money to execute their objectives
- work is performed
- money is spent
- when all program/function objectives are met and all charges have been made, any money left over is considered savings
- this money would be deposited into a gainsharing fund

One major drawback of this method is (especially in the case of government, RDT&E facilities), direct programs may be given less money the following year by their sponsors. With funding cuts resulting from productivity increases, it will become harder each year to show a savings. Thus, less money will be accrued for the gainsharing system. Indirect or in-house projects can also have their funding reduced through internal management decisions, because of productivity improvements. The major pitfall of the savings method is that it tends to be short-term, with savings diminishing to zero in a few years. The benefit is that the money is readily accessible because it has already been allocated.

#### 2.9.1.2 Existing Incentive Pots

A portion of an organization's present incentive system, could be used for GS. Some or all of this money could be allocated for gainsharing. In most government organizations, the money allotted to this incentive equals about 1% of the total payroll. One percent is a small amount compared with non-government organizations, who normally average about five to ten percent of payroll. For NAWCADTRN, 1% amounts to about \$300 dollars a person per year. Some of the existing incentive pots that could be tapped were discussed in Section 2.6. Existing incentive pots could be an initial funding source for a trial run of GS. Then funding could be augmented by other sources, if the trial run was successful. The major benefit of this method is this money also is "real" and can be easily reallocated and applied to gainsharing.

#### 2.9.1.3 Target Savings With Bids

Gainsharing can be integrated into the bidding process, for major programs. For example, if an organization outbids other organizations on a program and then comes in under budget, there are savings. A target savings figure could be established as part of the contract bid or it can be tracked internally. Charleston Naval Shipyard (CNSY) operated their entire GS system on this premise. These savings would be deposited into the GS fund. However, if a program runs over budget, money should be extracted from the gainsharing fund.

Some organizations may not be totally "free market." In NAWCADTRN's case and in many government, RDT&E facilities, there is an unfair advantage when comparing direct funded programs to any competition, because there is no overhead charged to their direct programs. To compensate for this unfair comparison, they would need to add an imaginary overhead cost to direct programs. This total theoretical cost must be less than competitors' bids before they could validly state that there were savings. A productivity ratio figure (53-56% in NAWCADTRN's case), which is direct funding divided by total funding, can be used to add on this imaginary overhead charge. So the direct charge would almost have to be doubled to compensate for the overhead not charged.



With indirect work, savings can be proved when a function is performed in-house for less money, than if contracted out. Doing the job for less money is not the only decision criteria when awarding a project/function in-house as opposed to contracting. Planners and estimators look at available manpower, equipment required, time constraints, and technical expertise to name a few. So there must be some contingencies in the savings formula to account for these mitigating factors.

#### 2.9.1.4 Percent Taken From Budget

The basic concept behind this funding mechanism is to "tax" all programs/projects as a percent of either their total dollar value or some other amount (i.e., labor). Money collected from this gainsharing fee will be placed into some type of gainsharing pot. This can actually show up as a plant usage charge, which is common in many organizations. Money generated by this means is similar to taking money directly from the operating budget, which is the case with many gainsharing systems. If the gainsharing system is driven by a set of performance standards, money may have to be taken directly from the operating budget to afford payouts because of the variable payout potential.

NAWCADTRN uses a computer usage fee, which is charged to all direct projects. Funds accrued from this fee are deposited into a corporate improvement account. Money for the gainsharing system could be acquired in the same manner as this fee and deposited in the gainsharing fund. Money could then be withdrawn on a quarterly basis for payouts, the amount dictated by the performance measurement parameter.

Benefits of this method are that all work is taxed equitably and the money supply will be fairly stable. Some drawbacks of this method are: customers may not want "their" product/program taxed, it may be viewed by the public as unethical for public-sector systems, and this method may be more administratively difficult.

It seems reasonable that all "work" performed in an organization should have the possibility of contributing to the GS pot, not just the work that is easy to measure. Using a combination of the above four methods could tie the gainsharing system to a majority of the organization's work. This will reinforce the belief of employees that all work impacts the organization's mission and is equally important.

## 2.9.2 Distribution

Once a method for accruing a pot of money is established, the next design parameter is determining how to distribute the money. There are three major distribution issues that must be decided upon.

### 2.9.2.1 Organization-Employee Philosophy

The stance an organization takes, with regards to what variables are allowed to affect the size of bonuses, has to be made clear from the onset of gainsharing design. The two major philosophies are "shared-fate" or "productivity school." The difference between these philosophies is whether employee payouts should be adjusted for events out of their control and due to productivity improvements resulting from capital investments, or only due to direct employee effort.

Shared fate states that the employee can benefit or be penalized from productivity increases/decrease due to factors out of their control. Profit sharing plans operate on this premise. The productivity school believes that the employee distribution should only be affected by factors within their area of responsibility.

Many organizations use a simple ratio to split GS money between the organization and the employees. This is normally supposed to account for productivity improvements due to capital improvements funded by the organization. The "rule of thumb" is to use a 50/50 ratio. Fifty percent of the GS money goes to the organization for investments in

maintenance, plant modernization, or even training and the other half goes to the employees for the GS distribution. This is in-line with the shared fate philosophy.

#### 2.9.2.2 Organizational Levels

There are three basic organizational levels that an employee must identify with, and therefore be rewarded as a member of that level. These are: organizational, group, and individual. Based on organizational policy, a percentage of the GS fund might go into either the organizational pot and/or the group pot. The organizational pot would probably be distributed either equally (all get the same) or equitably (based on salary or hours worked) to all employees. No decisions of amount will have to be made at this level, so this decision is fully objective. A group pot could be distributed to work groups based on their performance. Individuals could even be rewarded for their outstanding contributions as a part of the group. There are many organizations that distribute incentives at all three levels, but only a few gainsharing systems. Decision-making responsibility for this type of payout scheme is discussed in the Employee Involvement design parameter.

#### 2.9.2.3 Mechanics

The first mechanical issue is to set a target for payout amounts. This will drive not what is measured, but what is considered an improvement over baseline performance. Your gainsharing system can be flawless in all design criteria, but if little to no payouts are the outcome of this system, it will fail.

The payout cycle of the gainsharing system tends to operate either monthly or quarterly, depending on administrative capabilities. The payouts should be given to the employees separate from their regular paychecks. This will help reinforce the idea that this payout is being made for a measured improvement in performance and not part of their "expected" paycheck. Payouts will vary from period to period, based on how well the

organization, work group, and individuals performed.

In many organizations, a Reserve Pool is established to cover quarters where performance decreased or savings are lost. If the organization chooses a shared fate philosophy, the reserve pool will be taken out of the overall pot. With the productivity school philosophy, non-employee factors are corrected out of the GS fund, so the reserve would be taken out of the employee share.

### 2.9.3 Performance Measurement

The major performance measurement issues are: whether measures drive payouts, the level of the organization where measures are established, and the objectivity of measures. Organizational level measures can have two purposes. They act as a validity check on the entire gainsharing system and they also dictate the distribution pot size.

#### 2.9.3.1 Relation to Payouts

GS funds should be subject to performance measures to ensure that payouts are not made when performance is substandard and will help to reinforce the pay-for-performance philosophy that most gainsharing systems embrace. But, some organizations may choose not to tie measures to payouts. For systems where the pot accumulates prior to the application of performance measures, such as those using savings, the measures can determine if the gainsharing pot needs to be adjusted so that payouts reflect performance. Systems using funds derived from the operating budget could use performance measures to determine the amount required to be extracted from the budget. In these cases, measures determine the size of the gainsharing pot. Some systems simply use measures as a validity check on the size of the pot.

#### 2.9.3.2 Levels

If the organization chooses to establish a gainsharing system with several payout levels, supporting measurement systems will need to be developed for each level. First, organizational measures must be established. These are extremely critical because they will have a trickle-down effect throughout the entire gainsharing system. If the decision is to have measures impact the GS pot, they will dictate the size of the GS fund. Organizational measures tend to be quantitative in nature, such as: input/output measures, customer satisfaction surveys, or Net Operating Result, for example.

Group measurement can take one of two approaches. Either comparing groups against each other (relative) or measuring each group against a standard (absolute). Group performance measurement can be very tricky, especially in service-type industries. Making relative comparisons requires that standards for each work group be established and groups that improve the most are then rewarded. The difficulty occurs because it is very hard to select a set of standards that can be used to compare work groups in a fair manner, especially in service industries and government, RDT&E activities. A qualitative approach can be taken were an assessment team can select the work groups they felt improved the most and define their payout amounts. For this to succeed, employees must place a great deal of trust in the capability and integrity of this Work Group Assessment Team (WGAT). Relative comparison has an advantage because you can preselect the number of groups to receive distributions, then define the groups to be rewarded. Absolute measures will require all groups be rewarded that exceeded their performance targets, thus causing more unpredictable payout levels.

The decision could be made to have an individual component, which could occur in two manners. The WGAT could identify individuals they felt were exemplary performers, while they are assessing teams' performance. The other way is that the work groups themselves could decide on how payouts will be distributed to each individual in the group. Some groups may opt for a simple equal share of the group payout. In this case, no individual component would exist.

### 2.9.3.3 Objectivity

The GS Design Team must determine the level of objectivity to be present in the performance measurement system. Highly objective systems are easy to defend and to track, but also run the danger of being too parochial in certain areas and inflexible. Highly subjective measures will normally be simple to administer, but can be accused of not being fair.

## 2.9.4 Employee Involvement

Employee involvement will exist to support many portions of a gainsharing system. The basic areas are in the development and in the operation of the system.

### 2.9.4.1 Development

Development constitutes involving employees in the design, implementation, and evaluation of the gainsharing system. Design, implementation, and evaluation teams are formed and should be representative of the entire organization. These teams must also tap values and beliefs of all employees, either through meetings, surveys, or some other means. When employees feel they were a part of the development of the system, they will feel more committed to its success and have more identity with it. Employees need to be involved in the constant evaluation and modification of the gainsharing system, either through surveys, suggestion boxes, or on-going committees.

### 2.9.4.2 Operations

Employees will be involved in the operations of the gainsharing system, which consists of: teaming to improve the organization, making decisions on payouts, and administration. Teaming can be accomplished formally, through a QMB committee system, or it can be accomplished informally, either through ad-hoc PAT teams, a

suggestion system, or a combination of both. This provides for a more open exchange of information, allowing those with the information on how to improve (the employees) an opportunity to develop and implement the solutions. This is a benefit to both the employees and the organization.

Employees can also be involved in assessing work group performance and determining payout amounts by being a member of a WGAT (mentioned earlier). This could be structured as a committee system, that mirrors the organizational structure, set up to conduct work group assessments. This helps to give the employees identity with the gainsharing system, by making them a critical part of one of its most visible operations, the payouts. The administration of the GS system should be handled by a group of employees that rotates periodically. This will provide employees with a thorough understanding of all facets of the system. Performance measures (explained in the previous parameter) may lend some insight into which work groups performed well to assist with distribution decisions.

Once work group GS awards are made, each particular work group can distribute the money any way they chose. They may decide to distribute equally to everyone in the group, distribute individual payouts based on performance, or a combination of both. Payout decisions may be made by either the group leader or by the entire group.

### 2.9.5 Integration

Taking a design and making gainsharing a permanent part of an organization's management system is a complex issue requiring a lot of continued planning and adjustments.

#### 2.9.5.1 Implementation

Implementation is the most difficult phase of any organizational intervention and is the

phase at which most of them fail. An organization must display a high priority on gainsharing, by recruiting enough of the right people to execute gainsharing implementation and providing them with the resources required for a complete and successful implementation. The implementation team will take the detailed design from the design team and develop the management systems required to operate gainsharing. A readiness assessment can be a first step to determine feasibility and the areas requiring special attention during implementation. Organizational meetings can also be held to increase employee awareness in the implementation phase.

In many cases, The major implementation issue is not what to do, because most gainsharing systems will possess similar attributes, but in what sequence to initiate these attributes. The employee involvement system could be established first to heighten the awareness of organizational improvement. Performance measures could be established first to help employees understand the organization's priorities and what level of performance is being achieved now. The bonus could be kicked off early or late depending on the significance the organization wants to place on the bonus. Some organizations may want to build up to the distribution of bonuses and others may want to secure early buy-in, through early payouts.

#### 2.9.5.2 Evaluation

Evaluation will be performed on both the product (gainsharing system) and the process (how it was developed and implemented). The system should be evaluated on a regular basis by an evaluation team and modifications made as needed. This team may be the group in-charge of the administration for the entire system. The employees must have a say in the evaluation. There is normally an employee vote taken on whether to continue with the gainsharing program. Attitude surveys may also be used to determine whether to proceed and to define what areas need improvement to make the system more effective.



The general gainsharing model is depicted on the following pages in Figure 2.4, showing the five design parameters, their attributes and options, and the relations between them. The next chapter will outline a methodology to validate this model and specify it for a government, RDT&E facility.

# GENERAL GAINSHARING MODEL

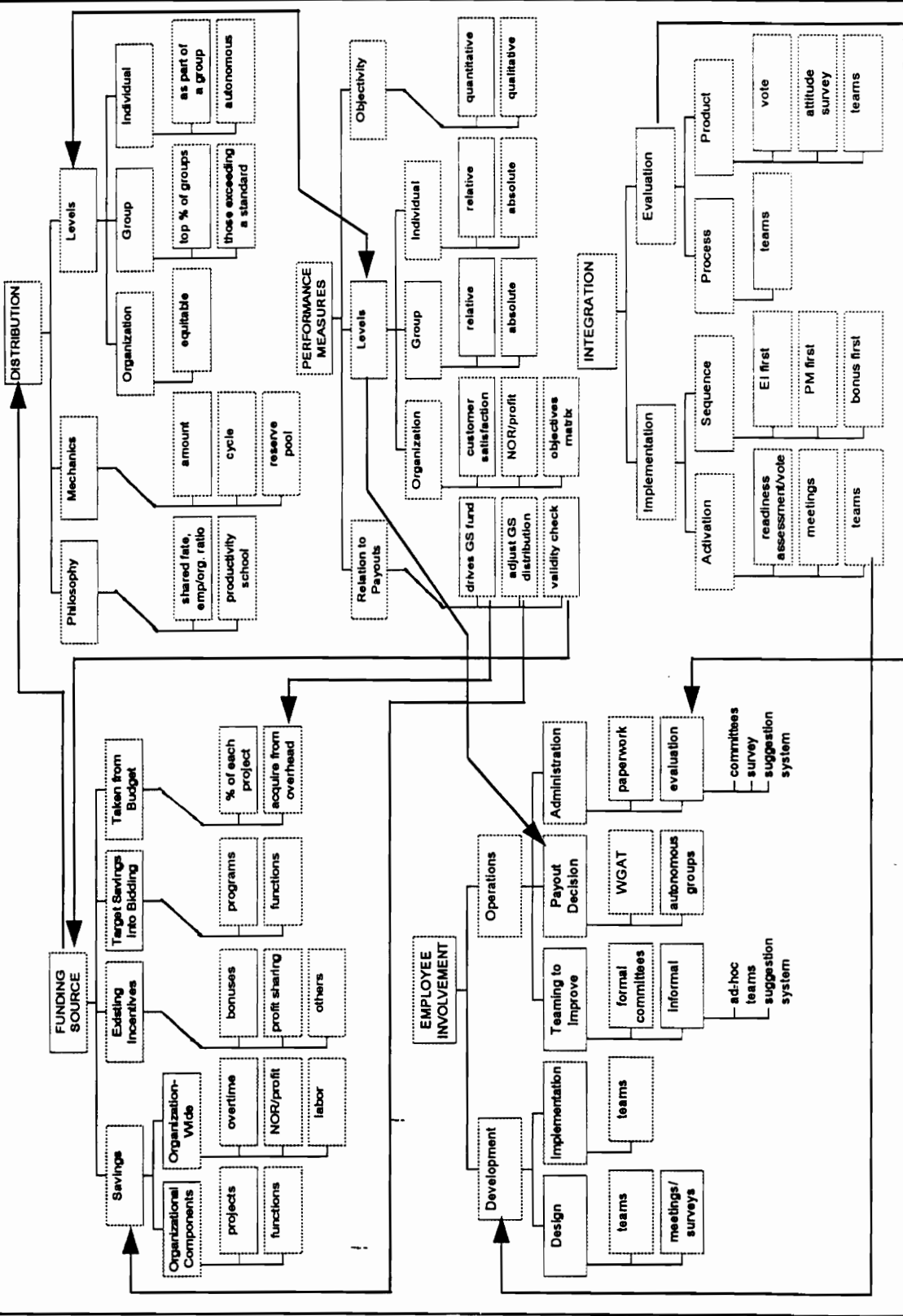


Figure 2.4. General Gainsharing Model

# DESIGN PARAMETER #1

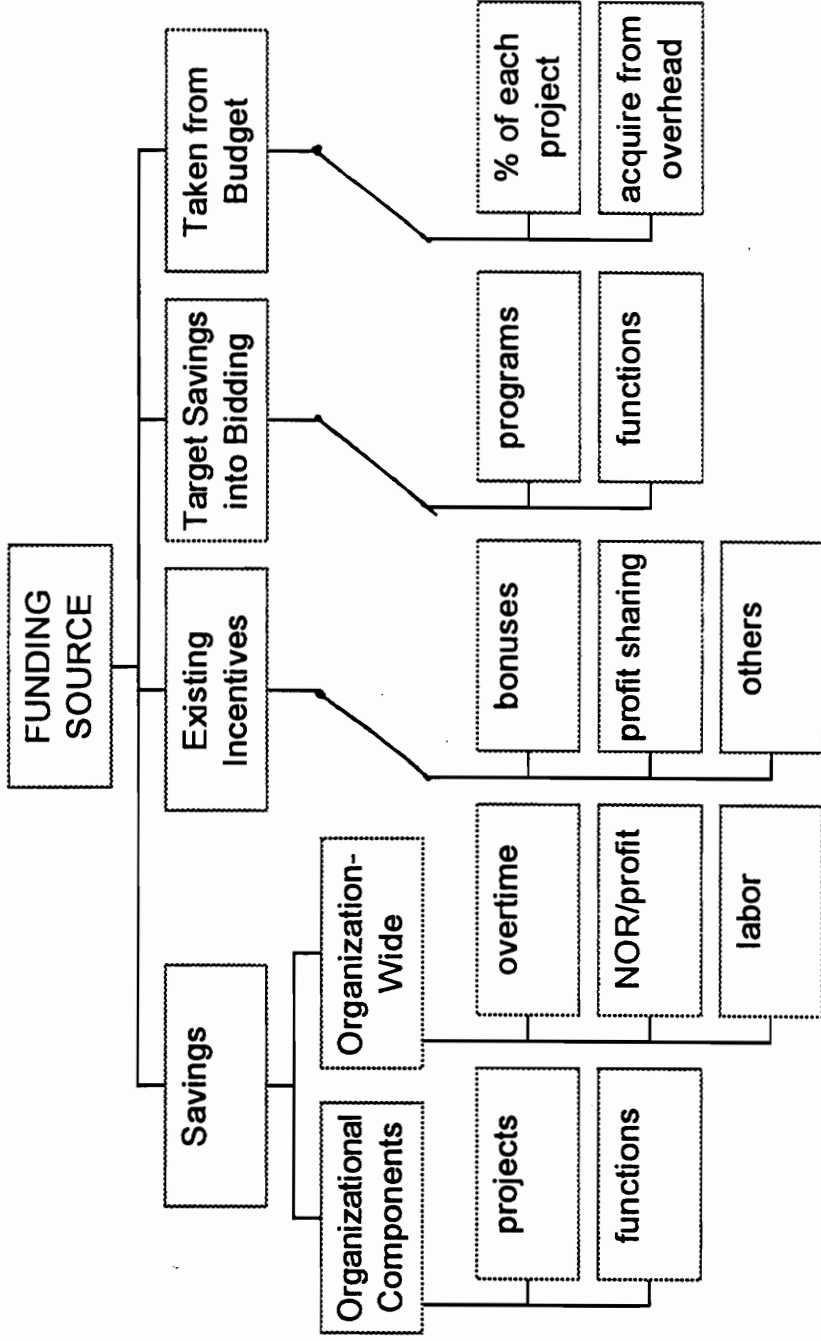


Figure 2.4. (cont)

# DESIGN PARAMETER #2

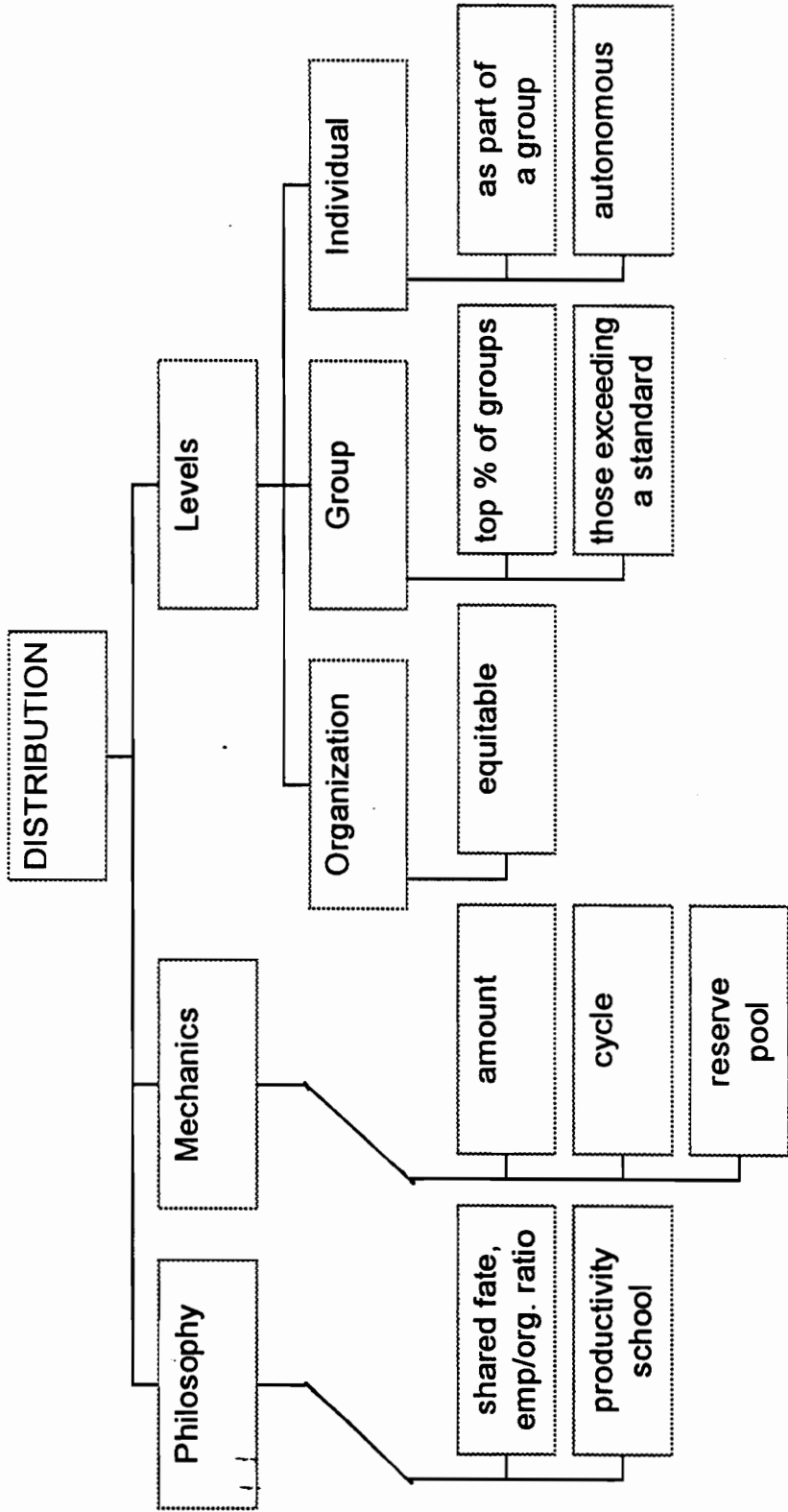


Figure 2.4. (cont)

# DESIGN PARAMETER #3

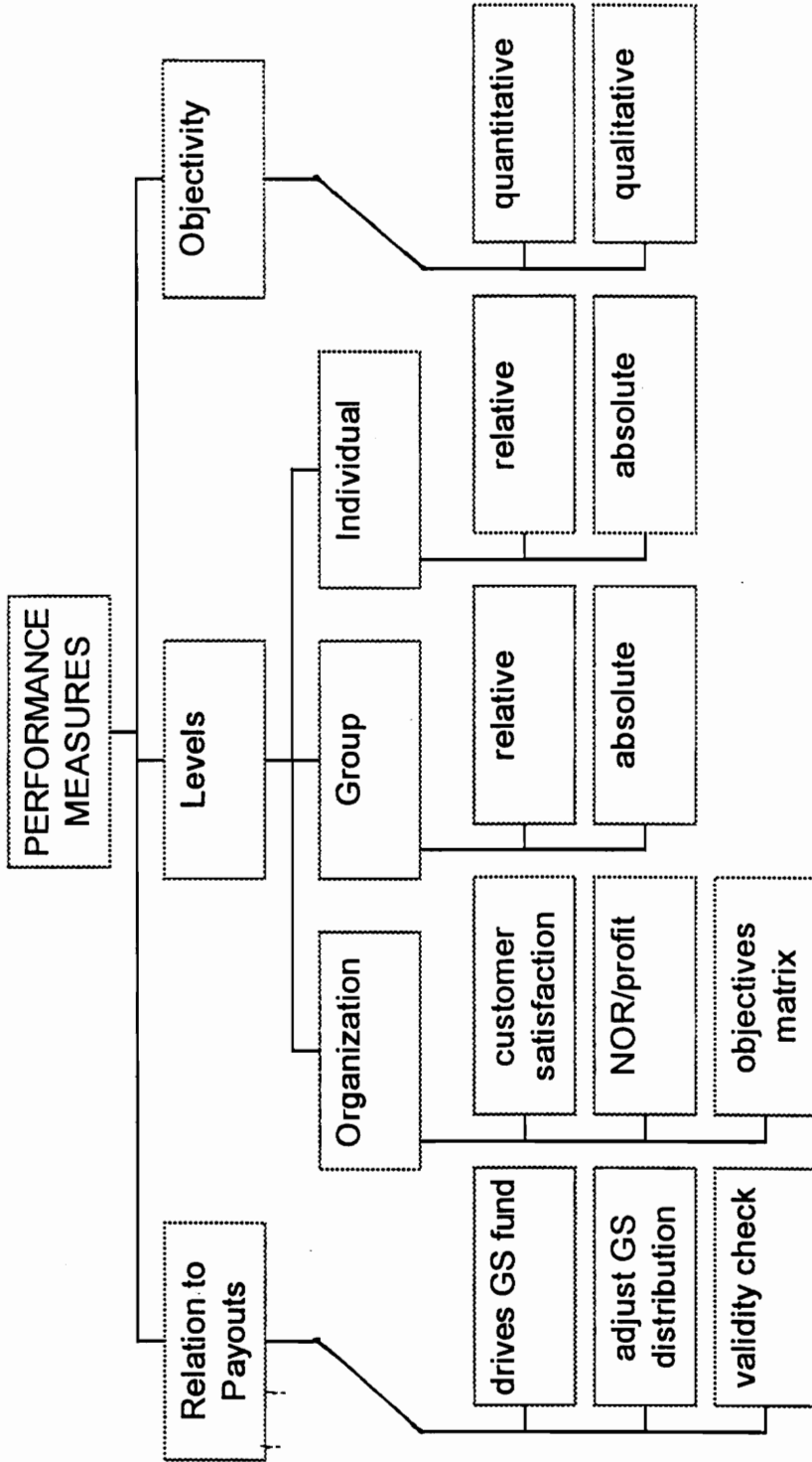


Figure 2.4. (cont)

# DESIGN PARAMETER #4

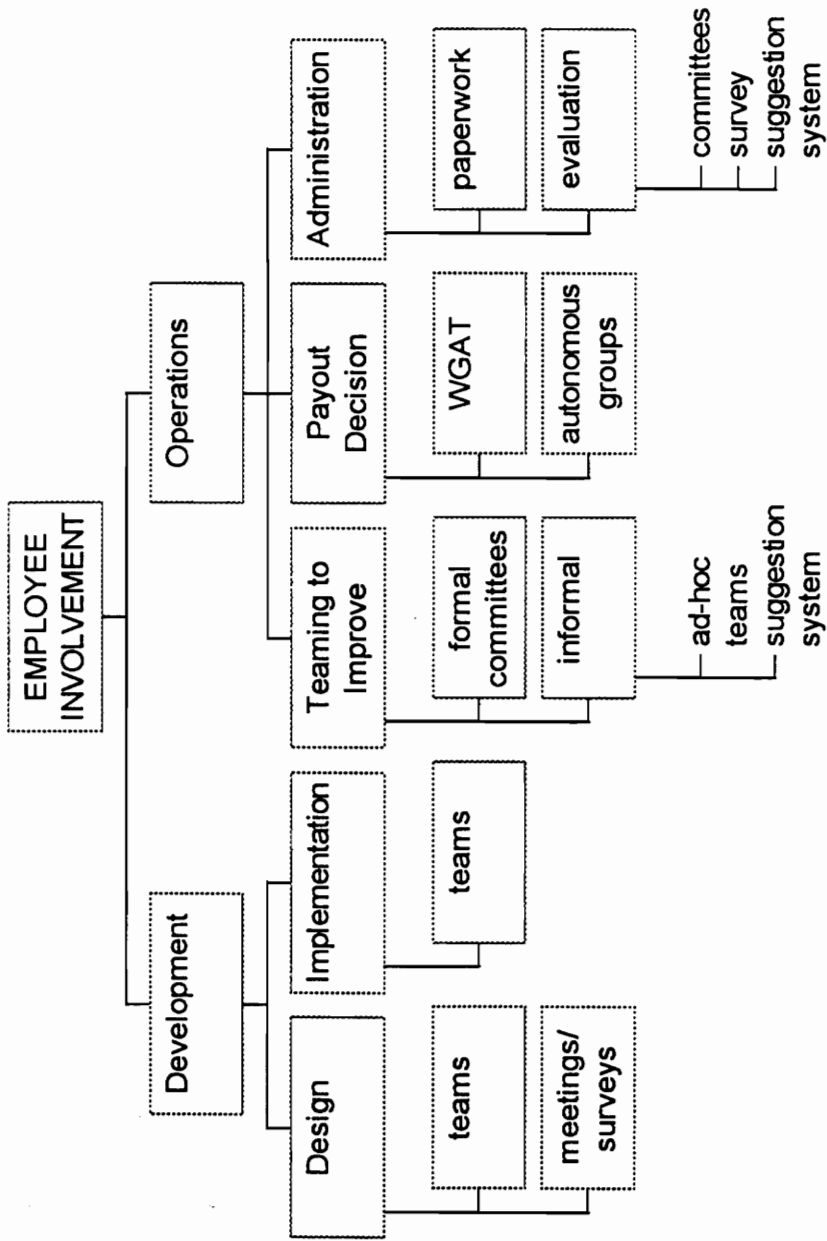


Figure 2.4. (cont)

# DESIGN PARAMETER #5

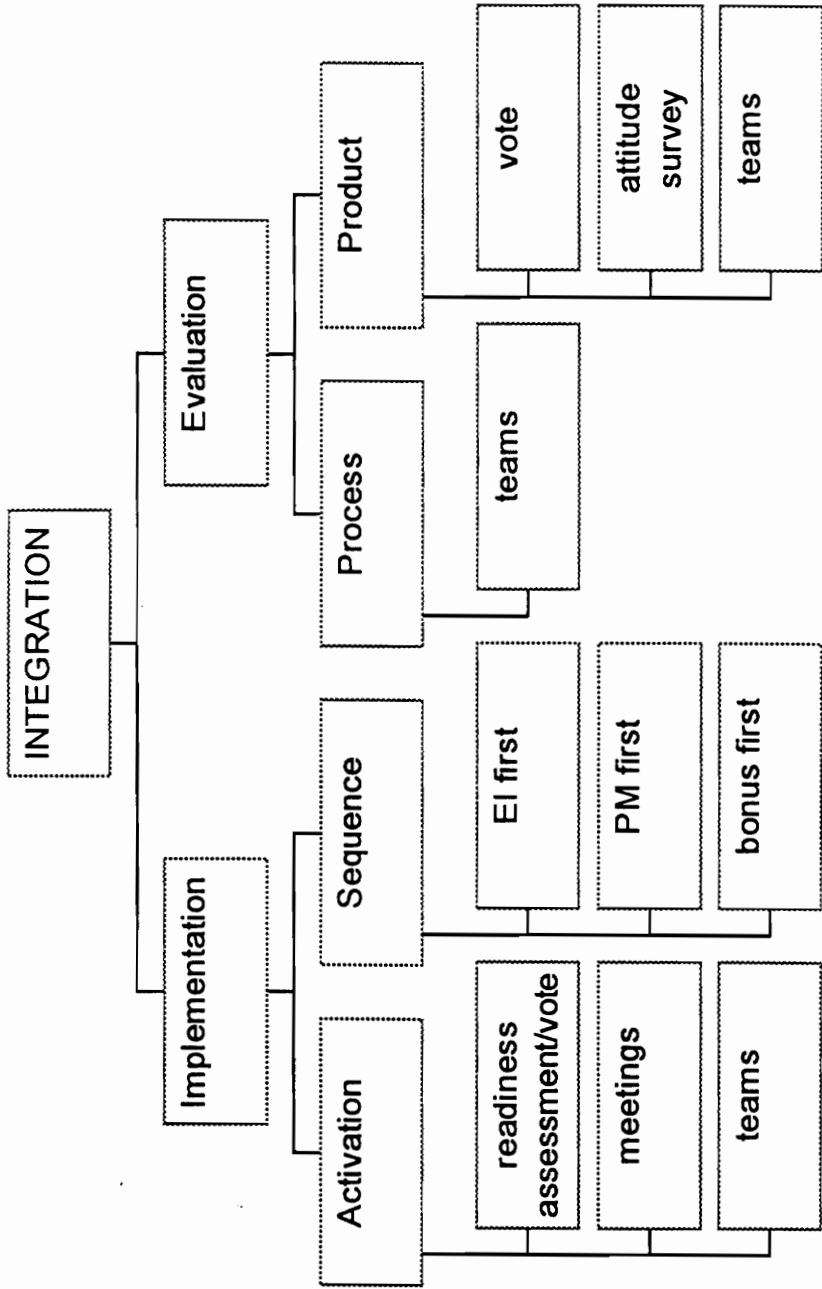


Figure 2.4. (cont)

## CHAPTER 3: RESEARCH METHODOLOGY

This chapter outlines a process to validate the general gainsharing model, outlined in the previous section, and to specify the model for a government, RDT&E facility. All data collection and information assimilation methods will be outlined. Figure 3.1, on the next page, depicts the research methodology.

### 3.1 Data to Information Interface

All research efforts follow the same basic methodology. They gather data, transform it into information, and make decisions with regard to the topic of interest. Kurstedt's (1988) Management Systems Model (MSM) depicts how an information system assists managers in making effective decisions. The MSM is shown on the page following the research methodology, in Figure 3.2. In this thesis effort, the gainsharing model is "What is Managed." This chapter will develop and describe the tools that are in the "What is Used to Manage" box and the instruments that make up the measurement to data interface.

#### 3.1.1 Data Sources

To better organize data collection, two general categories of potential data sources that would provide information in support of the research questions were identified. These were: interviews and surveys. Under each category, specific data sources were identified. A third type of data source, written documentation, was investigated in Chapter 2 and a fourth type, observation, will not be used. The data sources and why they were selected are listed below for both categories.

##### 1) Interviews:

- NAWCADTRN Management: they understand the special attributes of an RDT&E, government facility and its people



# GAINSHARING RESEARCH METHODOLOGY

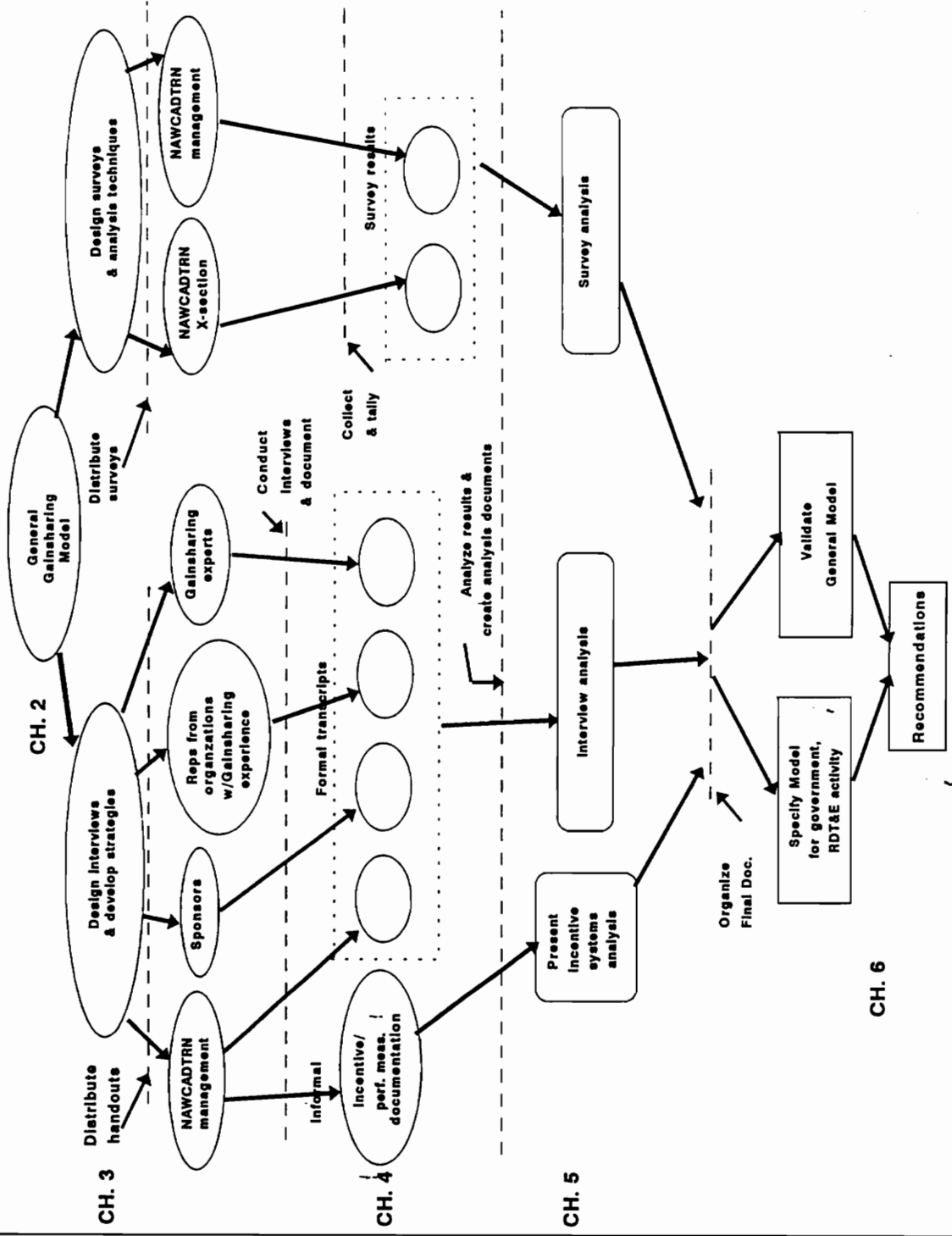
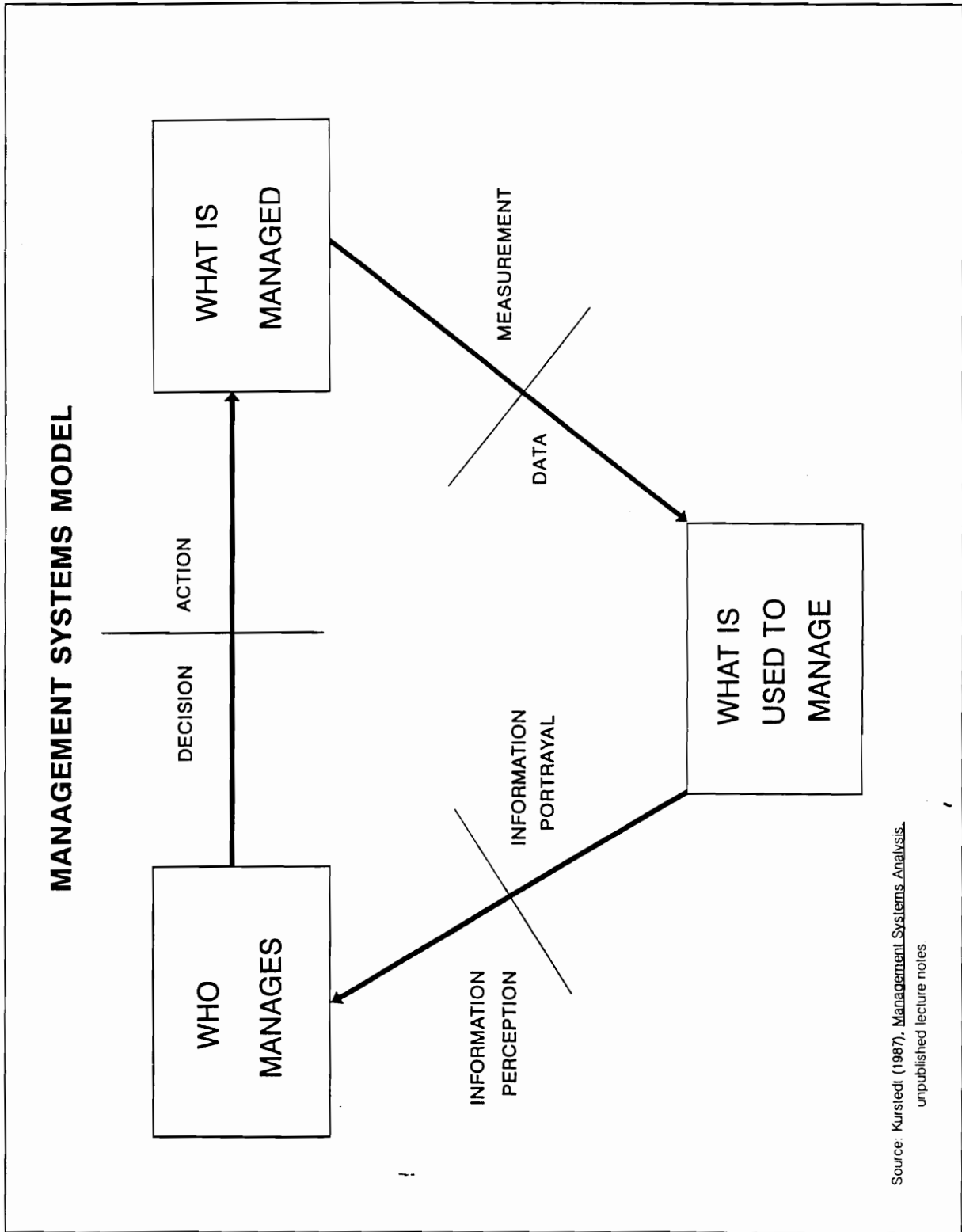


Figure 3.1. Gainsharing Research Methodology



Source: Kursiedt (1987), Management Systems Analysis, unpublished lecture notes.

Figure 3.2. Management Systems Model

- NAWCADTRN Sponsors (Customers): will ultimately pay for a gainsharing system
- Organizational representatives with gainsharing experience: have many lessons learned
- Gainsharing Experts: have the knowledge to assess the validity of the gainsharing model

2) Surveys:

- NAWCADTRN Employees: can dictate their gainsharing preferences
- NAWCADTRN Management: can dictate their gainsharing preferences, also compare with employees

Each data source will be approached with a list of questions to answer. Table 3.1, shown on the following page, is a matrix that portrays how the data sources will satisfy the information requirements.

### 3.1.2 Information Requirements

The set of research questions define the information requirements to guide this research effort. Again, these are:

- 1) What are the general design parameters for a gainsharing system?
- 2) How do you integrate a general gainsharing design into your organization?
- 3) How do you ensure this general gainsharing model is valid?
- 4) How do you specify this general gainsharing model for a RDT&E, government facility?

Figure 2.4, depicted a general gainsharing model that was developed by addressing the first two research questions. A great deal of information must now be gathered to answer the last two questions. To make sound decisions with regard to these questions,

Table 3.1. Information Requirements vs. Data Sources

Information Requirements	Interviews				Surveys			Documents
	NAWCAD TRN Management	NAWCAD TRN Sponsors	Org. w/ GS experience	Gain-sharing experts	NAWCAD TRN Employees	NAWCAD TRN Management	Literature Review	
1) What are the GS design parameters (model)?							X	
2) How do you integrate GS into an organization?							X	
3) Is the general GS model valid?			X	X				
4) How to specify the general model for a gov., RDT&E facility?	X	X			X	X		

I will need to acquire the appropriate information. This means acquiring the "right" information from the "right" information sources. A list of primary information requirements is identified below for each data source. A particular data source may provide information pertaining to other information requirements.

### 3.1.2.1 Surveys

This section outlines the information that is desired to gather from the two surveys I will distribute. The overall information requirement for each data source is listed in the form of a question.

#### 3.1.2.1.1 NAWCADTRN employees

A survey was developed (explained later) to examine the feasibility of implementing a gainsharing system at NAWCADTRN. This survey will be distributed to a sample of NAWCADTRN employees. The survey will gather employee preferences relative to several of the gainsharing design parameters.

- What are your preferences with regard to gainsharing?

#### 3.1.2.1.2 NAWCADTRN management

This survey will be identical to employee survey, except for some minor word changes. This will be distributed to the NAWCADTRN Executive Board. The results of the management survey will let me compare the perceptions of top-management against those of the employees.

- What are your gainsharing preferences as compared with the employees?

### 3.1.2.2 Interviews

This section outlines the interview groups and the information expected to be gathered from the interviews.

#### 3.1.2.2.1 NAWCADTRN management

Several NAWCADTRN managers from various departments and backgrounds from throughout the Center will be interviewed, to collect the following information:

- How should each design parameter in the general model be specified for gainsharing at NAWCADTRN?
- Gather input on possible measures of NAWCADTRN's performance and perceptions on existing incentive systems.

#### 3.1.2.2.2 NAWCADTRN sponsors

This group will be formed from a complete list of sponsors/customers, used for distribution of a customer-satisfaction survey. The list is fairly large, so a cross-section of NAWCADTRN customers that are a representation of the entire customer population will be selected. The following information will be collected:

- How should each design parameter in the model be specified for gainsharing at NAWCADTRN?
- Would you support some type of gainsharing system at NAWCADTRN and what should it look like?

#### 3.1.2.2.3 Organizations with gainsharing experience

Several organizations that have extensive gainsharing experience from Chapter 2 will be identified. A point of contact, who worked most closely with the organization's gainsharing system (e.g., gainsharing coordinator) will be located for a potential

interview. Several organizations having similar characteristics to NAWCADTRN (e.g., government, RDT&E) and some that are different will be chosen.

- Does the general gainsharing model seem complete/logical?
- How did your organization specify its gainsharing system?

#### 3.1.2.2.4 Gainsharing experts

Finally, several "experts" in the field of gainsharing will be chosen. This group will be gathered by selecting a few of the most prevalent authors on my reference list.

- Does the general gainsharing model seem complete/logical?

### 3.2 Data Collection Methods

After identifying the general information required from each data source, specific data collection methods need to be developed. This section outlines procedures on how I will collect all data to support my research.

Rosler (1991) tried to determine how gainsharing works to affect organizational performance. His method was to interview six managers to develop a site-specific model that depicted how gainsharing variables and relationships interact. He then developed a general model of how gainsharing affects organizational performance, based on a review of the literature. My method will be just the opposite. I developed a general model based on a literature search. Then I will validate the general model and develop a site-specific model, through interviews and surveys.

Scarpello (1983) used in-house questionnaires of employees and managers, and interviews with management to assess results of Organizational Dynamics interventions in an organization, which was a R&D firm. It was not specified how the results from the two

data collection techniques were combined. An analysis of questionnaire results was performed by examining means and standard deviations and then integrating this with the qualitative interview information, as will be done in this methodology.

### 3.2.1 Surveys

The survey will provide the means to define employee preference with regards to the general gainsharing model. Results of the survey will help develop the government, RDT&E gainsharing model.

#### 3.2.1.1 Distribution

A sample group to receive the survey needed to be defined. Naturally, to get the most accurate results, the survey would be distributed to the entire Center. Because of the logistical problems associated with distributing a survey to 760 people, getting returns, tallying responses, and analyzing the results, it was determined that taking a sample would be more efficient and just as effective, if done properly.

Babbie (1982) conducted many organizational surveys and recommends to use at least a 1 in 6 sampling. This gainsharing survey was distributed to a 20% cross-section of employees. Since the return rates on previous surveys handed out to NAWCADTRN have been very high (a 1986 quality survey had 94% return rate), a sample size of 1 in 5 was felt to be a conservative ratio. Joseph Kennedy, statistician at NAWCADTRN, and Michael White, Analyst with the Naval Personnel Research and Development Center, concurred with this decision.

The sample must be representative of the entire NAWCADTRN employee population to make any valid inferences from the results. Proper selection methods were extremely important because of the heterogeneity of NAWCADTRN's employees. This sample could end up with a non-representative sample, without careful selection methods, which



would bias the survey results. It was felt that a random sample would provide a representative sample group. Leedy (1985) states that randomized samples can be an easy and effective way to collect a representative sample. The stratified random sample is another method, where a sampling is taken from major population sub-groups (strata). The sub-groups (i.e., age, gender, race, etc.) are not mutually exclusive, so this method could become cumbersome and won't be used.

NAWCADTRN's Personnel Data Management Officer (Eunice Irvin Johnson) was approached to seek her help in selecting a sample. Several variables were tracked, which were: work area, grade level, age, gender, experience, race, classification, and position type. An ideal sample, of course, would consist of 20% of all people for that variable. Ms. Johnson wrote a program to randomly select 20% of the people from NAWCADTRN and outline the demographics of the final sample. The sample chosen was remarkably close to 20% in all categories. The demographics of the final sample are shown in Appendix A. Based on the variables selected, the representativeness of this sample was excellent.

The management survey was distributed to the TQM Council (25 people). NAWCADTRN's Commanding Officer (CO), Captain Park suggested I using this group to represent management. The TQM Council consists of all department heads and above and selected staff level positions. The TQM Council is identical to the Executive Board, except there are two additional people on the TQM Council. The Executive Board is the body that makes all decisions relating to the Center's strategic direction. The results of the management survey were compared with those of the NAWCADTRN cross-section to determine if any major differences in perceptions exist between the two groups. Only the employee results were used to define the specific model.

#### 3.2.1.2 Collection

The survey was sent out to the selected sample via internal mail, with a cover letter and

a return envelope. It was asked that the surveys be returned in approximately a week and explained that the results of the survey be available in about a month.

When the surveys were returned, the results were tallied and the data inputted into an Excel spreadsheet. These spreadsheets tabulated scores for each construct for both the employee survey and the management survey. The construct scores were then interpreted based on the survey assumptions. This helped define employee preferences towards the gainsharing design parameters.

In October 1990, a survey called the Quality Orientation Profile (QOP) was distributed throughout NAWCADTRN to assess the employee's attitudes with regards to quality. NAWCADTRN management wanted to determine if recent TQM initiatives had an effect on employees. The results were analyzed by a Florida company called Human Resources, Inc. Some of the areas this survey examined overlapped some areas of this gainsharing survey. So, the QOP was used to validate and substantiate the results. There were several other surveys used to help validate the survey also.

### 3.2.2 Interviews

Interviews were chosen as a means for validating the general gainsharing model and specifying the model for NAWCADTRN, because of the "real time" information that can be gathered. Interviews can be an easy way to gather information, if structured properly. Dijkstra (1982) stated that 50% of all research efforts use interviews as a data gathering means to some extent.

The interviewer should try and remove the effects of variables related to: 1) task (four different groups were used to get a well rounded view of gainsharing), 2) respondents (a sample for each of the population groups was taken), and 3) interviewer (a standardized interview process was used). Rossler (1991) states that qualitative methods such as interviews must address: representativeness, reactivity, replicability, and

reliability, which is a reiteration of the above three variables.

In a study by Rossler (1991), his interview process had one interviewee select four others to be interviewed. Each person was selected to provide a different perspective of the organization and some of these interviews were group and some were individual. Rossler classified his interview sample as random, purposeful, and convenient. He taped the interviews and had those interviewed edit the transcripts. A causal model of gainsharing was built, based on the interview results. Then the interviewees critiqued the model that was developed. The interview process for this thesis effort was similar to Rossler's, except (4) distinct interview groups were formed prior to commencing the interviews.

An interviewer's objective is to record the true answer (Dijkstra, 1982). In the interview communication process, there is bias from the "true" answer to the response and there is bias from the response to what is recorded and interpreted. The only way of controlling response bias is not to lead the interviewee. To check whether there was any recording bias, a second person could have been present at the interview to compare consistency of results to determine if there were any differences in interpretation. However, this was not deemed to be necessary.

### 3.2.2.1 Formal Interviews

As stated earlier in my this Chapter, interviews were conducted with: NAWCADTRN management, NAWCADTRN customers/sponsors, representatives from GS organizations, and GS experts. Of course everyone that falls into each one of these categories cannot be interviewed. So, a sampling from each group will be taken.

The basic format for each interview and subsequent analysis was as follows:

- Before the interview, a copy of the questions was sent to the interviewee, along with a description of the general gainsharing model. This let the

interviewee formulate his/her initial thoughts and provided some time for these thoughts to incubate. Prior exposure to questions helped to keep the interviewees focused and minimized tangent discussions during the interview.

- During the interview, I took notes only to enable me to ask better follow up questions. Each interview was taped, so there wasn't a need for me to take comprehensive notes. Some interviews were conducted in-person and others via the telephone. The questions the interviewee received previously, were adhered to closely and, in some cases, I relevant follow-up questions were asked that were not on the interview form.

- After the interview, the summarized transcripts of each interview were typed and submitted to the people interviewed for their approval. Following the approval, a short interview analysis was developed. This analysis helped provide insight to better address the research questions.

### 3.2.2.2 Informal Interviewing

This type of interview was not be tapped and no transcripts were compiled. Basically, the documentation was gathered from several sources to help provide a better understanding of the NAWCADTRN systems that will influence GS. Areas investigated were possible performance measures and present incentive systems.

#### 3.2.2.2.1 Performance measures

Several appropriate NAWCADTRN management and administrative personnel were interviewed to identify a set of possible measures to support a gainsharing system. These measures may presently be in use, or they may be potential measures.

#### 3.2.2.2.2 NAWCADTRN incentives

Representatives from Civilian Personnel (CP) and the Budget Office were interviewed to gather appropriate documentation on incentives. All the incentive systems presently in use at NAWCADTRN were investigated. The mechanics of each system, how they operate and associated policies were assessed. The payouts for several years were analyzed to detect any trends. Incentive award inequities between organizational sub-groups were then explored.

### 3.3 Instrument Development and Analysis

Instruments were developed to gather and analyze the needed data for this research effort. Specific forms were distributed to the people which were interviewed and surveys to the survey sample. Various management tools were also developed to analyze the data collected. This section outlines the development of these forms and tools.

#### 3.3.1 Surveys

There are several instruments that can be used to assess employee preference with regard to gainsharing, such as: interviews, suggestion boxes, and surveys. There are numerous existing surveys, which can be used to investigate issues related to the gainsharing design parameters. A complete set of survey instruments could not be compiled to gather the required information. So a new survey specific to these my information requirements was developed. The process followed to develop this survey and the supporting tools to help perform the data analysis are explained below.

##### 3.3.1.1 Construct Development

Based on the knowledge acquired in the background search, a list of 11 constructs were identified for this survey. These constructs were designed to provide information on employee preference with regard to the gainsharing design parameters in the general model. Dooley (1990) defines constructs as abstract aspects of reality. These constructs

will help assess the feasibility of implementing gainsharing at NAWCADTRN and will help identify the organizational changes that need to be made before gainsharing can become a reality. The survey will also provide information on employee preference towards the five design parameters.

The 11 constructs are categorized into three general categories: 1) Employee Attitudes, 2) Perceived Reward System, 3) and NAWCADTRN Characteristics. The "Employee Attitudes" constructs will indicate employee preference towards the design parameters. The "Perceived Reward System" and "NAWCADTRN Characteristics" constructs helped determine organizational deficiencies and gainsharing feasibility. In this section, each construct will be explained in the first paragraph and a strategy to address the construct in the second paragraph. Refer to Figure 3.3 on the next page, which depicts the relations between all the constructs.

#### 3.3.1.1.1 Employee attitudes

Three constructs were developed to explore employee attitudes, which investigate the feasibility of gainsharing and employee preferences.

1) Intrinsic vs extrinsic motivation of the work force. This will determine the saliency NAWCADTRN workers place on monetary and other tangible rewards as compared to non-monetary rewards. Extrinsic motivators are defined as something tangible that has utility to the receiver (i.e., money and time-off). Intrinsic motivators make the receiver "feel good" (i.e., doing a quality job, completing a job on time). Gainsharing is extrinsically focused, using monetary bonuses, but can and should be integrated with intrinsic rewards. My presumption is a person can be both intrinsically and extrinsically motivated.

The extent to which employees are motivated by money and other tangible incentives was examined and compared to the motivation NAWCADTRN

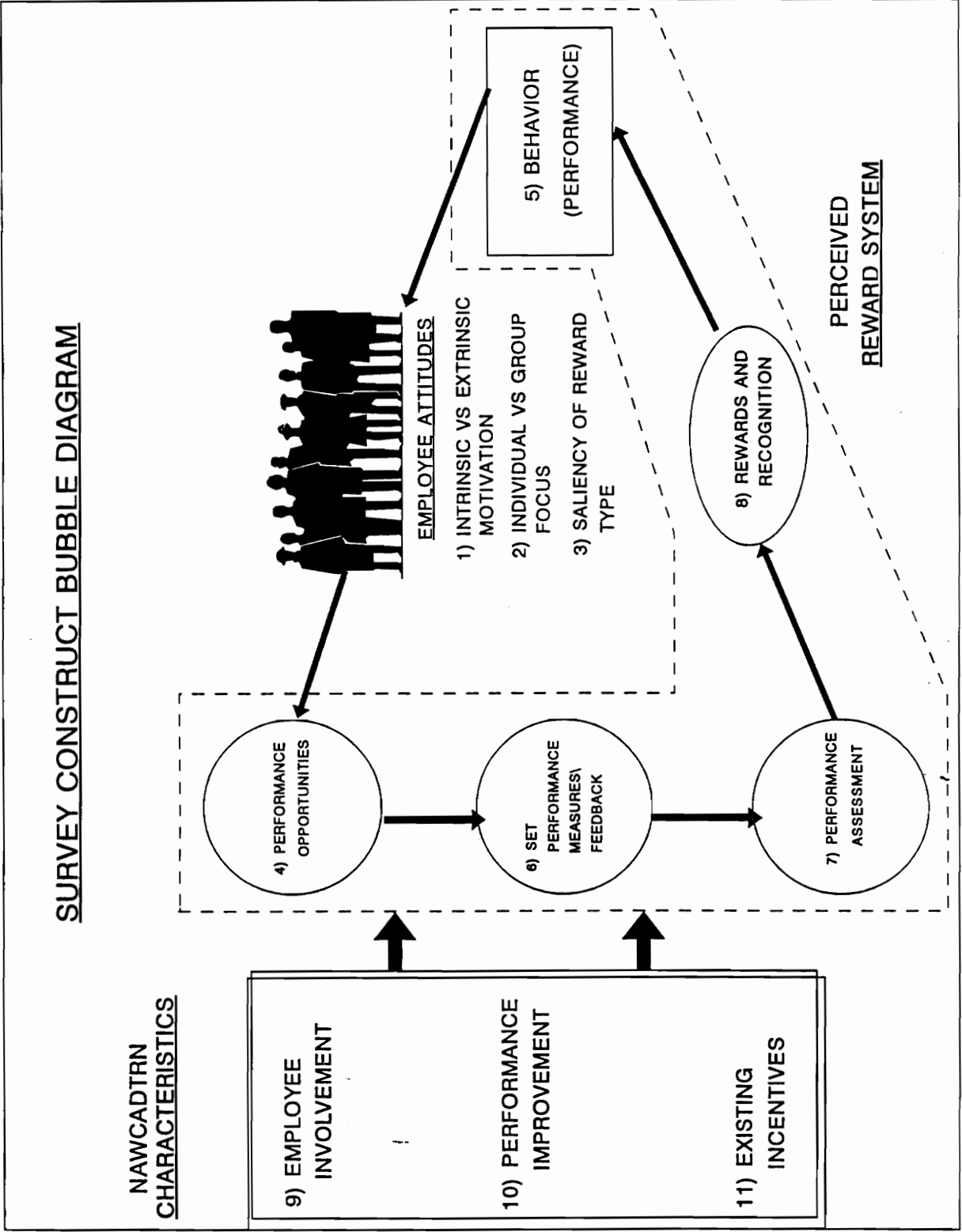


Figure 3.3. Survey Construct Bubble Diagram

employees have simply to perform their job well.

2) Group vs individual focus of NAWCADTRN employees. Gainsharing systems are focused on rewarding at the organizational and group levels, thus providing workers some identity with these levels. It is felt that if there is a high individual focus at NAWCADTRN, the gainsharing system will suffer. Individual focus is defined as the tendency to be concerned solely with doing your own job and not caring about organizational or group success. An individually focused person chooses to partake mostly in individual problem-solving. A person with a group focus has a team orientation and the willingness to help those around them. This person works well in groups and would enjoy and benefit from group problem-solving. Based on these operational definitions, a person that has a high individual focus will have a low group focus.

Whether employees prefer to work and be rewarded as individuals was investigated and the extent that they are concerned with the results of their work group was determined. An attempt to determine how much teamwork exists and how willing people are to help each other was also made.

3) Saliency of reward type. It is extremely important to gather some data on what dollar amounts will motivate NAWCADTRN employees to improve. Knowing if employees would be against having equal gainsharing shares is also vital information.

The employees were asked explicitly if they would support equal shares and what reward amounts are necessary to influence them to improve their job performance.

#### 3.3.1.1.2 Perceived reward system



A determination of whether there are any perceived problems with NAWCADTRN's present reward system was attempted. If there was, gainsharing would probably not be feasible at this time. Five constructs were developed to examine the five steps of the reward process. If NAWCADTRN employees perceive a problem with any one of these steps, the entire reward process, and thus gainsharing, will fail. The reason being, there would be a lack of confidence by the workers that high or improved performance will be rewarded.

- 4) Performance opportunities available. The first step in the reward process is that you are given the opportunity to perform well. The opportunities available should have the potential to produce results that have visibility and may be rewarded, so that fellow employees will witness your high performance.

Whether employees felt they are given the opportunity to partake in challenging tasks that will bring them recognition and/or reward if they are performed well was investigated.

- 5) Behaviors exhibited. Once given the opportunity to perform, you must take advantage of these opportunities. An employee must put effort forth in the opportunities that are afforded to him, if they expect to be rewarded.

A determination if employees felt they are performing at an acceptable level and if they are taking advantage of the performance opportunities available to them was made. Whether employees attempt to improve their performance at NAWCADTRN was also investigated.

- 6) Validity of performance measures/feedback. There should be valid measures to assess how well you performed. Performance should be measured in the appropriate areas that are a valid representation of your job. All employees should be aware of the measures used to "judge" performance. Supervisors and

fellow employees should be providing feedback on jobs you have done well/poorly to help assess your level of performance and to improve. Feedback is an informal type of performance measurement.

Whether employees feel their performance and their work group's are being assessed in the appropriate areas and how aware the employees are of these areas was probed. Also an investigation if the assessment is made on a timely and regular basis and if feedback is coming through formal as well as informal mediums was made.

7) Fairness of performance assessment. The performance measures from the previous step are used in this step. The people assessing your performance should be fair and objective. They could be using the "right" performance measures, but using them in an unfair manner. There should be minimal bias in selecting and using performance measures. If accurate measures are available but are not used appropriately, the reward process will break down.

How fair and objective the employees feel that their performance is assessed by their supervisor and fellow workers, based on available performance measures was determined. The perceived bias in the "grading" of performance and the level of trust present was determined.

8) Recognition and reward. Once performance is assessed, rewards and recognition are given. These should reinforce future good performance. The incentives for doing a good job must be of value to the person doing the job or the desired behavior won't be reinforced. If you are told you performed well and thought this was a fair and accurate assessment, but were given a reward of little or no value, your good performance is not reinforced. You may also feel inequity with fellow employee's recognition and rewards. In some cases, the realization of having performed well may be reward enough for some people

(intrinsically motivated).

An investigation of how valued the rewards and recognition given for high performance are to NAWCADTRN employees was performed. Also the perceptions of pay/reward equity of employees with in-house and outside employees were examined.

#### 3.3.1.1.3 NAWCADTRN characteristics

There are three constructs in this category that examine several relevant traits of the organization to assess gainsharing feasibility.

9) Employee involvement. Employees should feel they can have some input into the way things are done at NAWCADTRN and believe that his/her voice is heard. Employee Involvement (EI) is giving employees the opportunity to participate in decisions that may effect them. An effective EI system appears to be a necessary condition for a successful gainsharing system.

Whether the employees perceive the atmosphere at NAWCADTRN is one where the employee feels they are given the chance to be involved was investigated. An attempt to determine if employees believe top-management listens to what the employees have to say was made.

10) Performance improvement. Gainsharing is an improvement tool. The organizational culture must support efforts to improve for gainsharing to be successful. Employees must also have the desire to improve for gainsharing to be successful. The organization should portray a desire to constantly improve for the workers to act accordingly.

An examination of if the employees feel there is support for attempts to improve

the way their job is done was made. You should examine the extent to which employees believe they can improve NAWCADTRN.

11) Existing incentives. To justify the value of implementing a gainsharing system at NAWCADTRN, I must examine the incentive systems now in use. If people are unhappy with the present state, a change is probably necessary.

A determination of what people think about the Individual Performance Awards System and the Quality Suggestion Program (where individuals/groups are rewarded and recognized) was made. These are the two major incentive systems that are presently used at NAWCADTRN.

#### 3.3.1.2 Question Development

It was important to gather information on how individuals perceived themselves relative to the previously listed 11 constructs. Insight into how the respondents believe the constructs relate to their work group/NAWCADTRN was critical to acquire. For example, someone may believe they receive less than adequate rewards and recognition. That same person might believe others receive rewards and recognition that are of more value. It was necessary to examine each construct based on the respondent's perception of themselves and also based on the perception they have of their work-group's/NAWCADTRN's situation. These two types of wording of questions on several other gainsharing surveys reviewed was seen.

In survey construction, the items must be clear and concern important aspects of the subject matter. Multiple choice answers tend to be better than essay answers because you can sample more people, touch on more topics, be more objective, and is easier to analyze (Nunnally, 1967).

In constructing test items, most should be either moderately positive or negative.

Extremely positive or negative wording on questions tend to bias answers by driving answers towards a neutral or non-committal answer (Nunnally, 1967). The pool of questions should have equal number of positive and negative questions. But you have to be careful organizing the questions, so not to confuse the respondents. Nunnally recommends to keep all scales pointing in the same direction. Graphical scales are a good tool to minimize both response and data errors. The reliability of a Likert-type scale tends to level off at seven answers (Nunnally, 1967). Also, an odd number of answers with the middle answer being neutral is a good graphical technique. A graphical 5-point Likert scale was used for this gainsharing survey.

The next task was to determine approximately how many questions to have for each construct. It seemed logical that the minimum number of questions would be four. This would give two questions for each frame-of-reference (individual and group), within each construct. A first guess at total questions for the survey was to have a maximum number of 60 questions, which was felt would be enough for the respondents. This would equate to around 5 questions per construct, one more than the self-imposed minimum. Avoiding too many questions on the survey was critical to its validity because people might get turned off and not fill out the survey or fill it out carelessly.

A list of questions to probe for information supporting each construct was made. The strategies for addressing each construct, mentioned in the previous section, to develop a list of questions was used. Some constructs seemed to be fairly well represented with the minimum of 4 questions, while others required up to 10 questions to properly investigate that construct. The third construct (Saliency of reward type) only required 2 questions because of the question directness.

The final number of questions turned out to be 70. This exceeded the original goal of 60, but was necessary to provide the information required to meet the objectives for this survey. The questions developed are shown by constructs in Appendix B. The final survey that was distributed to employees is shown in Appendix C.

Nunnally (1967) recommends using a minimum of ten respondents per item in each construct to remove any random sampling error (Nunnally, 1967). The largest construct has 10 items, so at least 100 respondents were required, which was exceeded.

#### 3.3.1.3 Management Survey

The survey needed to be tailored slightly to distribute to NAWCADTRN management. Some terminology was changed, while keeping the basic premise behind each question the same. It was strongly felt that the modifications made in tailoring the survey to top-management did not change the meaning behind the question. For example the phrase "fellow employees" was changed to "fellow managers" on one of the questions.

The final sample of the NAWCADTRN cross-section did not include any top-level management, except for 1 person. This was fortunate because overlap between the two groups was minimized. Ironically the computer selected the TQM Coordinator (Paul Piscopo), who strongly supported this gainsharing effort.

#### 3.3.1.4 Analysis of Survey Responses

To analyze survey responses, an average for each question was calculated based on all respondents' answers. The average scores were then be grouped by construct, and within each construct, questions were grouped into either individually or group/NAWCADTRN focused questions. A separate analysis of the employee's responses from the management responses was also performed. The analysis of questionnaire results was performed through examining means and standard deviations. The following analysis will be conducted:

- Assessed the means for each construct (having a maximum possible score of 5) to determine if there are any perceived problems in any of the constructs.
- Investigated the means of specific questions.

- Compared the means for all the individually focused questions with the group/NAWCADTRN questions to determine whether individuals perceive themselves as better or worse than those around them within any of the constructs.
- Compared employee scores to management's to uncover any major differences between groups.

In cases where there seems to be a problem with one of these constructs, individual questions were probed to attempt to better pin-point the specific problem. Nunnally (1967) suggests correlating an item with the construct score or overall test score to validate the importance of an item. This analysis was not performed though. Nunnally states you should use the sum of at least 6 scales to assess attitudes. Unfortunately in some cases only 4 were used, but didn't appear to negatively impact this assessment.

The results of the survey analysis provided an indication of NAWCADTRN's strong and weak areas in support of a gainsharing system. Based on these results, a determination of gainsharing feasibility and where improvements are needed to have a better chance for a successful gainsharing system were identified. For example, a perceived difficulty or mistrust in the use of performance measures might cause a need for more employee involvement in the development of these measures or more visibility of the measures before implementing a GS system. These results helped to define a specific gainsharing model for a government, RDT&E facility.

### 3.3.2 Interviews

Conducting thorough and objective interviews is an extremely difficult operation (Dooley, 1990). The proper list of questions must be developed and the interview responses must be compiled and analyzed in an unbiased manner. The question development is discussed, along with an explanation of how the results were analyzed.

#### 3.3.2.1 Interview Forms

All people interviewed received an interview form, prior to being interviewed. Each interview contained the list of questions to be asked and a description of the general gainsharing model. This section will discuss the interview questions that will be used in all 4 types of interviews. The questions were developed to address research questions #3 and #4, as is depicted in Table 3.1. The following groups received interview forms: NAWCADTRN management, Sponsors (customers), gainsharing organizations, and gainsharing experts. The four groups were issued different sets of questions because some questions were not appropriate for some of the groups. Appendix D shows a copy of the package sent to the interviewees.

### 3.3.2.2 Interview Checklists

The interview checklists will be different for each type of interview because of the different question sets. This tool will help portray the significant themes relative to the research questions. A sample set of these checklists are shown in the Appendix E.

### 3.3.3 Other Instruments

There are many instruments that can be used to assess an organization's readiness for gainsharing. Woodman (1985) identified several studies that measured the following organizational traits:

- organizational climate (Boss & McConkle, 1981)
- work attitudes (Conlon & Short, 1983)
- communication (Davis, 1979)
- satisfaction (Hess, 1978)
- power relationships (Keller, 1978)
- role clarity and collaboration (Morrison & Sturges, 1980)
- productivity/customer satisfaction (Paul & Gross, 1981)



Scarpello (1983) used a collection of instruments to measure organizational climate/structure. These instruments (explained below) could be a good tool for use in a gainsharing feasibility study. Lawrence and Lorsch (1969) developed the instruments used by Scarpello to measure environmental uncertainty and time-frame orientation and Moor (1969) developed the instruments for the other variables. The instruments measured the following variables:

- environmental uncertainty
- time-frame orientation
- degree of bureaucratization
- supervisory style
- frequency of communication between supervisor/subordinates
- freedom and autonomy to handle own tasks
- frequency of communication between colleagues
- similarity of technical strategies between colleagues
- coordination of effort between supervisor and work group

This collection of instruments form an excellent library of tools to assess how ready an organization is for gainsharing.

### 3.4 Integration of Information

This section explains how the results from the interviews and surveys were used to validate the general gainsharing model and to develop specific issues for a government, RDT&E organization.

#### 3.4.1 General Model Validity

The literature review helped identify prevalent design decisions that organizations were forced to make when developing a gainsharing system. Several major issues emerged

to become design parameters. The case studies in the literature review defined the major implementation and evaluation issues associated with gainsharing, also. The combination of the design parameters and integration issues helped formulate the general gainsharing model, shown in Figure 2.4.

Only the interviews were used to validate the model. Two of the four interview groups assessed the validity of the general model. Representatives of organizations with GS experience and gainsharing experts were contacted to validate the model. They received a description of the general model and were asked if the model is valid and how it can be improved. Modifications were made to the general model based on this feedback.

#### 3.4.2 Specification Issues

Both interviews and surveys were employed to define the specific gainsharing issues for NAWCADTRN. The combining of two information sources required some type of preplanned framework to objectively integrate the results. Since NAWCADTRN is a government, RDT&E facility, it was assumed that this specific model will be applicable to all government, RDT&E facilities. NAWCADTRN management and NAWCADTRN sponsors were asked to specify the gainsharing model by defining the options (from the general model) that they feel would work most effectively. The same number of people were interviewed in both groups and each group is assumed to have equally important insights into what will work best. Thus the results from each group was basically weighted equally. Management provided an "inside the box" perspective and the sponsors provided an external viewpoint.

Only the results of the employee survey were used to specify the model, so management input was not weighted too heavily (they are also being interviewed). The results of the management survey was used to compare with the results from the employee survey. See Table 3.2, on the following page for the survey construct relations to gainsharing design parameters. Each survey construct gathers information to specify some of the design

Table 3.2. Gainsharing Design Parameters vs. Survey Constructs

DESIGN PARAMETERS

Survey Construct	1) Funding Source	2) Distribution	3) Performance measurement	4) Employee involvement	5) Integration
1) Int/ext motivation				high level of int. motivation will want more involvement	establish bonus first if ext. motivation is high
2) Group/ind motivation		what levels to distribute to	what levels to measure	group focus is necessary for effective EI	establish EI first with high group focus
3) Reward type	dollar amount required to supply system	equal or equitable			
4) Perf. opportunities			will measures be valid	how free are employees to be involved	
5) Behavior exhibited				employees that act on opportunities will be more involved	
6) Perf. measurement			how effective is present perf. measurement	is there feedback from groups	
7) Fairness of measurement			perceived fairness of perf. meas.		
8) Recognition and rewards	are much additional payouts required	is recognition desired and what distribution philosophy to use	should meas. system drive payouts and the perf. to reward connection		
9) Employee involvement		who should decide payouts		how involved are employees	should high involvement exist in implementation
10) Perf. improvement					is the organization focused on improvement
11) Existing incentives	should existing system be tapped	should existing incentives continue			

The above table indicates the information that each survey construct will provide in support of the five design parameters, in order to define issues specific to a government, RDT&E gainsharing model.

parameters for gainsharing at NAWCADTRN.

The results of the employee survey and the interview results were weighted equally. This provided an approximate weighting of 50% employees, 25% management, and 25% customers, which is felt to be an equitable distribution of input on dictating how the model should be specified for NAWCADTRN.

### 3.5 Validity Issues for Thesis Effort

For there to be a high degree of confidence in the results of this research effort, several validity issues must be addressed. The validity of both the process (research methodology) and the product (general and specific models) must be examined.

#### 3.5.1 Process Validity

The validity of the research methodology is dictated by several validity issues. These issues are described below, along with explanations of how they relate to certain steps in this methodology. All validity definitions are taken from Leedy (1985), except where indicated.

##### 3.5.1.1 Criterion Validity

The data should correlate with other measures used to measure the same data. Peter (1986) defines this as convergent validity, which is two different measures that measure the same things having consistent results. Divergent validity predicts low correlations between different measures of different traits.

- The results of the management interviews and the management survey should produce similar results on related themes, such as employee involvement, level of performance measurement preferred, and whether there should be equal shares.

- The results of the Quality Orientation Profile (QOP), which was distributed in 1991, and other similar surveys should yield similar results for similar themes/questions.
- Some of the interviews could be conducted by someone else. If there were no major differences in results, interviewer bias is probably not present. This was not felt to be a necessity and wasn't performed.

#### 3.5.1.2 Content Validity

The items within the instrument must adequately probe the constructs of interest. For an instrument to be content valid, items must be representative of the constructs and a sensible method of construction used (Nunnally, 1967).

- Interview questions are specifically worded to gather information on the design parameters or to validate the model. These questions could be viewed as the interview constructs.
- The survey questions are designed to measure a set of eleven constructs. To check this validity a survey test group was used, which will be explained in section 3.5.1.7.1.

#### 3.5.1.3 Construct Validity

Construct validity is the extent to which the constructs in question are the "correct" constructs. The set of constructs must be a complete representation of the overall domain. It does not under-represent or have surplus characteristics (Peter, 1986).

- The gainsharing design parameters are the constructs to build both the interview and survey instruments. The validity of this set was judged by

interviews with organizational representatives having gainsharing experience and by gainsharing experts.

- The survey constructs must gather information on the design parameters. These relations are depicted in Table 3.2.

#### 3.5.1.4 External Validity

This is concerned with the generalizability of the conclusions reached from examining the sample in question. Generalizability is dictated by the validity of the sample.

- First, the generalizability of the general gainsharing model is dictated by the representativeness and rigor of the data review. This review was very thorough, and it represents an acceptable interpretation of the field.
- Selection of interview samples was done carefully. Though they are each small groups, all four groups are felt to be representative of their population group. A second interview group could be used to validate the results of the specific model. This method will not be employed, though.
- The selection of the two survey samples was done very objectively. A computer program generated the employee cross-section and the Executive Board was used for the management sample.

#### 3.5.1.5 Internal Validity

The freedom from bias in forming conclusions from the data gathered. You must have internal validity to have external validity.

- All interview questions were based on the last two research questions. Either

to validate the general model or to define the specific model. The interviews were taped to ensure that all information was captured completely.

- The survey results were based on the numerical means from the individual questions and the constructs means. Any comments were integrated into the construct means to ensure objectivity. Also, the sample was an excellent representation of NAWCADTRN.

#### 3.5.1.6 Reliability

The degree to which observed scores are free from errors of measurement, ensuring repeatability.

- The questions remained consistent for each interviewee. All interviews were taped and transcribed word for word. The objectivity and the well-documented steps of the interviewing process helped to ensure repeatability.
- A specific methodology of distributing, tallying, and analyzing the survey was used. The objectivity of the survey collection and analysis procedures will enable someone else to distribute the survey and achieve consistent results.

#### 3.5.1.7 Survey Validity

As a basic check on survey validity, a test case was conducted. Other surveys that were distributed to NAWCADTRN employees and other similar organizations were used for comparison purposes. This helped lend face validity to the survey, which was a critical instrument in this research effort, which is a gainsharing model.

##### 3.5.1.7.1 Test group for survey

After the final draft of the survey was completed and distribution, collection, and analysis procedures were finalized, an operational test on the survey was performed. The purpose of this test was to:

- 1) remove any possible ambiguities in the survey instructions and particular questions.
- 2) test collection and analysis procedures to confront and remove any problems, before distributing the survey to 20 percent of NAWCADTRN.
- 3) run a validity check on the questions supporting the survey constructs I developed.

A cover letter and survey was distributed to five people from different departments of NAWCADTRN with very different job functions and backgrounds. People that would provide a sincere effort were chosen. It was requested that they approach the survey by filling it out as if they received it without knowing any more than what the cover letter explained. They were asked to point out problems they had with particular questions and if they had any problems with the instructions. The surveys were received back several days after they were distributed. It took them on average, 20 minutes to fill out. Some minor changes to the survey based on the test group's input were made.

The responses to each question were tallied and plugged into a spreadsheet designed to calculate results. The spreadsheet worked extremely well and gave the test group's final mean score for each construct. A cover letter and sheet outlining their score for each construct and the mean for the entire group was then provided to them.

Each person in this test group was met with to explain how the survey was developed and gave them the operational definitions for each survey construct. Each person's score for each construct was revealed, along with the interpretation of their scores.

Each person was asked to give a score from 1 to 5, representing to what extent they



agreed with the interpretation of their scores. A score of 5 meant they agreed strongly with the interpretation. The hypothesis for this exercise was that a mean which indicated strong agreement with the interpretations would lend content validity to the survey. There was a general agreement by the test group with the analysis for each construct. The results for this test group are shown in Appendix F.

The survey was also distributed to several key people at NAWCADTRN (Martin Dell, past 00Q; Paul Piscopo, present 00Q, and Captain Park, CO) to test its face validity. They all agreed that this survey would gather information to define employee preferences pertaining to the five design parameters.

#### 3.5.1.7.2 Other surveys

The Quality Orientation Profile (QOP) survey was distributed in early October, 1990 to assess how well NAWCADTRN work groups and individuals are aligned on quality issues. The Wilson Learning Company, located in Jacksonville, FL, developed the survey, reduced the data, and did the analysis. The QOP examines 3 dimensions of quality: focus, consequence, and process.

The results of this survey were used to correlate with the results of the employee survey for similar issues. In fact, since several of the questions are identical they were checked for consistency. The results helped lend criterion validity to the survey. Results from other surveys like the Naval Air Systems Team (NAST) and Naval Aviation Depot (NADEP) attitude surveys will also be used, in a similar manner, to validate the survey.

#### 3.5.2 Product Validity

It is important to assess the validity of the product of the research results, which in this case is a general model for gainsharing and specific issues for a government, RDT&E organization. This validation will all be performed as part of my research methodology.

### 3.5.2.1 General Model

The validity of the general gainsharing model was assessed through the interviewing process. This was accomplished through a face validity check. Face validity relies on the subjective judgement of the researcher or some outside body such as an expert panel (Leedy, 1985). A panel of gainsharing experts was used to judge the validity of the final product by simply stating whether the research results "make sense" and where the model could be improved. Slight modifications to the general model were made as a result of the interviews.

This expert panel was made up from two distinct groups: gainsharing organizations and gainsharing experts. They helped determine whether the general gainsharing model appears valid to them.

### 3.5.2.1 Specific Issues

The validity of the specific issues identified is first dictated by the validity of the general model, which is discussed above. Transforming the general model into the specific government, RDT&E gainsharing issues through interviews and surveys is of interest here. The previous section on content validity describes how this was accomplished in a valid manner. The gainsharing survey defines gainsharing feasibility and employee preferences regarding the design parameters. The interviews with NAWCADTRN management and sponsors specify almost exclusively design preferences.

A face validity check using an expert panel will not be conducted for the specific model in this thesis effort. A panel made up of representatives from several government, RDT&E organizations could be assembled to assess the validity of the specific issues identified.

## CHAPTER 4: DATA

This chapter discusses data collection procedures and portrays the raw data that was compiled from during this research methodology.

### 4.1 Survey Results

This section will provide supporting information on: the distribution and collection of the survey, assumptions that guide the analysis, and some quality control checks for ensuring the accuracy of the survey results. The survey distributed to the employees was the main information source and the management survey provided supplemental information.

#### 4.1.1 Distribution and Collection

The survey was distributed to a randomly-selected, twenty-percent sample of NAWCADTRN employees. The formulation of the survey sample is described in Chapter 3. A survey and cover letter was sent to 152 NAWCADTRN employees, via inter-office mail. It was requested that the surveys be sent back in the enclosed envelope within two weeks. After one month the results were tallied; 117 responses were received (77% response rate), almost all of these were in the first two days. Many calls from respondents, asking for a copy of the final results when they were available were received. When the analysis was complete, a copy of the overall survey analysis was placed on reserve in the Center library. All employees were notified that they were welcome to examine them. A summary of the results was published in the Center's newsletter, which is read by nearly all employees.

The management survey was distributed and collected in the same manner as the employees' survey. 22 responses out of the 24 surveys sent to management were received. Figure 4.1 depicts the population samples. The results of both surveys were provided to management in a briefing. The sole purpose of the management survey was

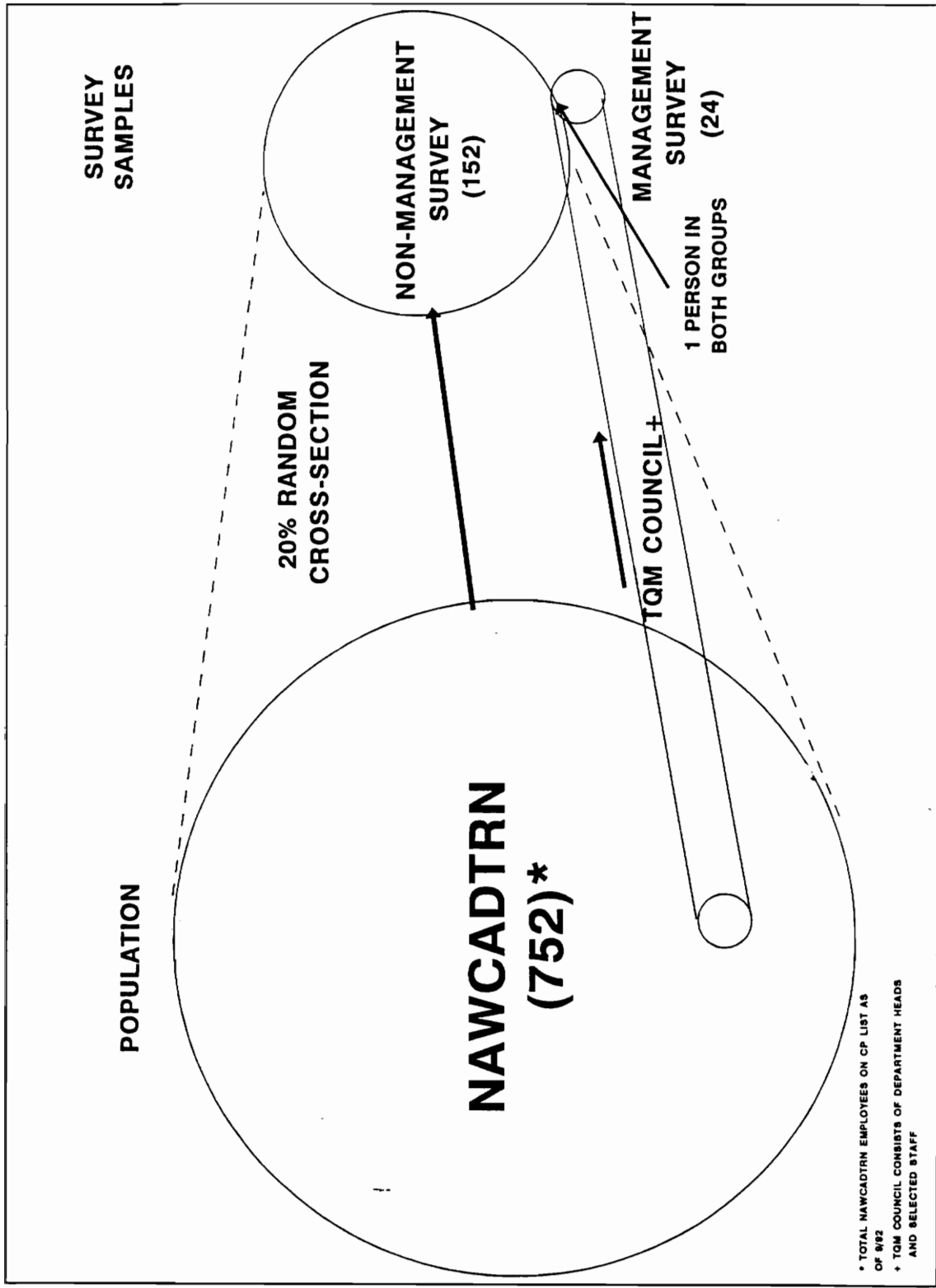


Figure 4.1. Survey Samples

to uncover any major differences in perception between management and employees.

#### 4.1.2 Assumptions

Several assumptions were made in analyzing the surveys, which are listed below.

- 1) Entry mistakes made by the respondents when filling out the surveys will cancel each other out. Respondents that mark an answer higher than they had intended will be cancelled out by people who marked too low of a score.
- 2) Answering bias (answering to make oneself look good) is recognized as a potential problem, but the complete anonymity of the survey will help remove a great deal of this.
- 3) Errors in the recording of responses will be insignificant. Many checks were performed to ensure that errors in the recording of survey responses were minimized. These are explained in the next section.
- 4) Some surveys were probably never received, because of mail problems. It was felt there was no bias in my sample due to the non-receipt of these surveys. This is a random event that didn't effect one population group more than others. Over 75% of the surveys distributed to employees were returned. It was felt that all of the 25% not received, chose not to respond and this group of non-respondents would not have changed results.
- 5) It was noted that some surveys seemed to be answered very quickly, without the respondents giving much thought to their answers (all answers the same on a particular page). Because of the sample size, it was felt that these type of responses will cancel each other out and not change the results.

6) To sabotage the survey, some people may have purposely put down answers that were opposite of what their real feelings were. These responses are insignificant and will cancel each other out.

#### 4.1.3 Survey Analysis Check

There were several sources of measurement error that could have occurred from the time all surveys were sent out, to the point where the results were generated. Some steps taken to remove as much measurement and recording bias from the survey as possible are listed below.

- 1) The mailing list was cross-checked with the outgoing survey envelopes to make sure that a survey was being sent to each person on my list. Also, since NAWCADTRN is not a big organization, the mailman knew each person to receive a survey. So a misspelled name or incorrect work code wouldn't cause a survey not to be delivered.
- 2) All of the respondent's comments were recorded word-for-word to minimize bias. These comments were categorized by major theme and some comments edited. The comments were then summarized by survey construct to help better define the specific government, RDT&E gainsharing model.
- 3) When tallying each survey, as the last answer from each page of the survey was recorded, the tally sheets were checked. It was easy to become a little overwhelmed in tallying the survey data and start marking answers in the wrong spot on the tally sheet. If an inconsistency was uncovered, it was fairly easy to correct because of this continual verification.
- 4) Each tally sheet recorded the results for all questions, for twenty-five respondents, so there would be 25 responses for each question. The questions

that were left blank were indicated as a "no answer," on the tally sheet to track all answers. On average, about 1 question per tally sheet was off by about 1 person, (either 24 or 26 recorded responses). This means about 1 piece of data per 1750 was missing or extraneous, a very small error.

5) The separate 25 respondent tally sheets were combined into 1 tally sheet, then checked to make sure the totals for each question came out to 117 for the employee survey and 22 for management (total number of respondents for each group). They all did.

6) As a quality control check, 3 questions (about 5%) were selected at random to do a re-tally, as a sample check on the original question tallies. These were retallied and retabulated for all 117 surveys for those three questions. The results were all consistent with the original results.

7) After entering all the data on the spreadsheet, as another check, 3 different questions were randomly selected to check. The means and standard deviations were then hand tabulated as a check on my data entry and the spreadsheet formulas. They were all consistent.

8) These checks instilled confidence that the numerical means and standard deviations for each question and for the constructs they form were extremely accurate. So, it was felt that the analysis was based on reliable numbers.

#### 4.1.4 Survey Tallies

A spreadsheet was developed to calculate all means and standard deviations for each question and each construct. The mean is where the average NAWCADTRN respondent falls for that question and the standard deviation shows how spread out the answers were. If the results were normally distributed, one could expect that 63% of the respondents

answered within plus or minus 1 standard deviation (SD) from the mean. However, it is not known whether the responses for each question were normally distributed. This can be determined through certain statistical techniques, but was not really necessary to the overall analysis, so this analysis was not performed. It appears that most questions were not normally distributed though. The basic assumption is that a low SD indicates solid agreement (tight distribution) on a question or construct and a high SD indicates weak agreement (wide distribution). There are two separate spreadsheets for the employee survey (see Table 4.1) and two for management (see Table 4.2) on the following 6 pages. The first spreadsheet provides the results strictly by question and the second organizes the results into constructs.

#### 4.1.5 Survey Validation

The survey was validated by comparing it to the results of other similar surveys that were distributed to comparable organizations. The intent was to compare the results of similar questions and constructs from this survey. Only a few similar survey constructs from other surveys that matched my survey constructs closely enough were found, while many questions from other surveys were very similar or identical to this survey were located. Three surveys were found that met the specification of similar survey and similar organization.

The first survey located was a cultural survey, distributed throughout the Naval Air Systems Team (NAST) to approximately 10% of the entire population of 30,000 people. This survey was developed by the NAST TQM office in conjunction with a consulting firm. The NAST is made up of five field activities (including NAWCADTRN), two test ranges, six maintenance depots, and about six supply and administrative commands located across the United States. There was about a 50% return rate on this overall survey. The specific results from the NAWCADTRN sample for this survey were obtained also, where the return rate was over 80%. Thirty-five (35) questions that corresponded very closely to items in the employee gainsharing survey were identified.



Table 4.1. Employee Survey Results

#	NAWCADTRN EMPLOYEES					117 RESPONSES			
	NUMBER OF RESPONSES FOR EACH QUESTION	1	2	3	4	5	SCALE # OF RESP	MEAN	STN DEV
1	10	6	6	6	6	6	6	6	6
2	11	11	11	11	11	11	11	11	11
3	12	12	12	12	12	12	12	12	12
4	13	13	13	13	13	13	13	13	13
5	14	14	14	14	14	14	14	14	14
6	15	15	15	15	15	15	15	15	15
7	16	16	16	16	16	16	16	16	16
8	17	17	17	17	17	17	17	17	17
9	18	18	18	18	18	18	18	18	18
10	19	19	19	19	19	19	19	19	19
11	20	20	20	20	20	20	20	20	20
12	21	21	21	21	21	21	21	21	21
13	22	22	22	22	22	22	22	22	22
14	23	23	23	23	23	23	23	23	23
15	24	24	24	24	24	24	24	24	24
16	25	25	25	25	25	25	25	25	25
17	26	26	26	26	26	26	26	26	26
18	27	27	27	27	27	27	27	27	27
19	28	28	28	28	28	28	28	28	28
20	29	29	29	29	29	29	29	29	29
21	30	30	30	30	30	30	30	30	30
22	31	31	31	31	31	31	31	31	31
23	32	32	32	32	32	32	32	32	32
24	33	33	33	33	33	33	33	33	33
25	34	34	34	34	34	34	34	34	34
26	35	35	35	35	35	35	35	35	35
27	36	36	36	36	36	36	36	36	36
28	37	37	37	37	37	37	37	37	37
29	38	38	38	38	38	38	38	38	38
30	39	39	39	39	39	39	39	39	39
31	40	40	40	40	40	40	40	40	40
32	41	41	41	41	41	41	41	41	41
33	42	42	42	42	42	42	42	42	42
34	43	43	43	43	43	43	43	43	43
35	44	44	44	44	44	44	44	44	44
36	45	45	45	45	45	45	45	45	45
37	46	46	46	46	46	46	46	46	46
38	47	47	47	47	47	47	47	47	47
39	48	48	48	48	48	48	48	48	48
40	49	49	49	49	49	49	49	49	49
41	50	50	50	50	50	50	50	50	50
42	51	51	51	51	51	51	51	51	51
43	52	52	52	52	52	52	52	52	52
44	53	53	53	53	53	53	53	53	53
45	54	54	54	54	54	54	54	54	54
46	55	55	55	55	55	55	55	55	55
47	56	56	56	56	56	56	56	56	56
48	57	57	57	57	57	57	57	57	57
49	58	58	58	58	58	58	58	58	58
50	59	59	59	59	59	59	59	59	59
51	60	60	60	60	60	60	60	60	60
52	61	61	61	61	61	61	61	61	61
53	62	62	62	62	62	62	62	62	62
54	63	63	63	63	63	63	63	63	63
55	64	64	64	64	64	64	64	64	64
56	65	65	65	65	65	65	65	65	65
57	66	66	66	66	66	66	66	66	66
58	67	67	67	67	67	67	67	67	67
59	68	68	68	68	68	68	68	68	68
60	69	69	69	69	69	69	69	69	69
61	70	70	70	70	70	70	70	70	70
62	71	71	71	71	71	71	71	71	71
63	72	72	72	72	72	72	72	72	72
64	73	73	73	73	73	73	73	73	73
65	74	74	74	74	74	74	74	74	74
66	75	75	75	75	75	75	75	75	75
67	76	76	76	76	76	76	76	76	76
68	77	77	77	77	77	77	77	77	77
69	78	78	78	78	78	78	78	78	78
70	79	79	79	79	79	79	79	79	79
71	80	80	80	80	80	80	80	80	80
72	81	81	81	81	81	81	81	81	81
73	82	82	82	82	82	82	82	82	82
74	83	83	83	83	83	83	83	83	83
75	84	84	84	84	84	84	84	84	84
76	85	85	85	85	85	85	85	85	85
77	86	86	86	86	86	86	86	86	86
78	87	87	87	87	87	87	87	87	87
79	88	88	88	88	88	88	88	88	88
80	89	89	89	89	89	89	89	89	89
81	90	90	90	90	90	90	90	90	90
82	91	91	91	91	91	91	91	91	91
83	92	92	92	92	92	92	92	92	92
84	93	93	93	93	93	93	93	93	93
85	94	94	94	94	94	94	94	94	94
86	95	95	95	95	95	95	95	95	95
87	96	96	96	96	96	96	96	96	96
88	97	97	97	97	97	97	97	97	97
89	98	98	98	98	98	98	98	98	98
90	99	99	99	99	99	99	99	99	99
91	100	100	100	100	100	100	100	100	100
92	101	101	101	101	101	101	101	101	101
93	102	102	102	102	102	102	102	102	102
94	103	103	103	103	103	103	103	103	103
95	104	104	104	104	104	104	104	104	104
96	105	105	105	105	105	105	105	105	105
97	106	106	106	106	106	106	106	106	106
98	107	107	107	107	107	107	107	107	107
99	108	108	108	108	108	108	108	108	108
100	109	109	109	109	109	109	109	109	109
101	110	110	110	110	110	110	110	110	110
*TOTALS	1032	1276	2062	2150	1301	7821	3.18	1.26	
		yes	no			total	x/yes		
69)		65	42			107	0.61		
70)									
*weight dollars # of yes						wt. x # of yes			
*1.00	100	14				14			
*2.00	200	30				30			
*3.00	300	30				30			
*4.00	400	30				30			
*5.00	500	30				30			
*6.00	600	30				30			
*7.00	700	30				30			
*8.00	800	13				13			
	1000	6				6			
	1500	2				2			
	2500								
	5000								
	10000								
*total		81							
	\$0	23							
						300			

Table 4.1. (cont)

*****NAVALCADTRN EMPLOYEES*****										
*CONSTRUCT	RESPONSES FOR EACH CONSTRUCT ALONG WITH MEANS					*# OF RESP	MEAN	STN DEV		
*-PERSPECTIVE	QUES #	1	2	3	4	5				
*INTRINSIC										
INDIVIDUAL	1)	2	4	14	35	62	117	4.29	0.93	
	2)	0	5	28	47	35	117	3.92	0.93	
	35)	0	5	28	47	35	117	4.40	0.80	
	36)	24	26	25	27	13	115	2.82	1.31	
totals		28	40	75	148	175	466	3.86	1.18	
NAPC	3)	2	21	40	38	14	115	3.36	0.97	
totals		2	21	40	38	14	115	3.36	0.97	
*EXTRINSIC										
INDIVIDUAL	4)	11	9	23	28	46	117	3.76	1.30	
	37)	24	20	25	32	15	116	3.95	1.34	
	38)	36	33	35	12	12	116	3.49	1.30	
totals		71	52	81	72	73	349	3.07	1.41	
NAPC	5)	17	28	35	23	14	117	2.91	1.22	
totals		17	28	35	23	14	117	2.91	1.22	
*INDIVIDUAL										
INDIVIDUAL	6)	26	27	25	22	16	116	2.78	1.35	
	7)	18	43	35	11	4	111	2.46	0.99	
	39)	48	34	23	9	2	116	1.99	1.04	
	40)	36	34	27	9	8	114	2.29	1.19	
totals		128	138	110	51	30	457	2.58	1.19	
NAPC	8)	10	15	37	25	25	112	3.36	1.22	
totals	41)	34	33	33	15	10	115	3.21	1.25	
		44	38	70	40	35	227	2.93	1.32	
*GROUP										
INDIVIDUAL	9)	9	13	29	40	22	113	3.47	1.16	
	10)	23	23	34	23	12	115	2.81	1.26	
	42)	0	2	17	55	41	115	4.17	0.74	
	43)	3	6	30	46	28	113	3.80	0.96	
totals		35	44	110	164	103	456	3.56	1.16	
NAPC	11)	17	34	41	17	7	116	2.68	1.08	
totals	44)	34	37	24	49	26	115	3.74	1.00	
	45)	2	7	19	51	34	116	3.88	1.04	
		25	52	84	117	67	345	3.43	1.17	
*PERFORMANCE OPPORTUNITIES										
INDIVIDUAL	12)	24	34	29	18	8	113	2.58	1.19	
	13)	18	15	37	29	12	111	3.02	1.22	
	46)	8	20	38	30	17	113	3.25	1.15	
totals		50	69	104	77	37	337	2.95	1.21	
NAPC	14)	28	28	31	17	10	114	2.59	1.25	
totals	47)	12	24	42	27	10	115	2.99	1.10	
		40	52	73	44	20	229	2.79	1.19	
*BEHAVIORS EXHIBITED										
INDIVIDUAL	15)	8	11	20	37	39	115	3.77	1.21	
	48)	5	11	35	21	24	116	3.59	1.05	
	49)	1	5	38	38	55	117	3.86	0.92	
totals		14	27	93	116	98	348	3.74	1.07	
NAPC	16)	4	11	40	40	20	115	3.53	1.00	
totals	50)	8	8	24	24	13	117	3.39	1.00	
		12	19	84	84	33	232	3.46	1.00	
*PERFORMANCE MEASURES										
INDIVIDUAL	17)	13	6	20	52	25	116	3.60	1.20	
	18)	17	11	20	35	32	117	3.50	1.58	
	19)	3	9	27	48	30	117	3.79	0.98	
	51)	7	11	19	48	36	115	3.77	1.17	
	52)	13	17	28	46	26	115	3.77	1.17	
	53)	10	18	34	35	25	116	3.33	1.26	
totals		63	72	148	247	166	696	3.55	1.16	
NAPC	20)	6	16	32	48	13	115	3.40	1.03	
totals	21)	18	31	35	28	4	116	3.73	1.09	
	54)	14	23	35	32	14	115	3.08	1.20	
	55)	2	6	25	29	24	111	3.77	0.91	
totals		40	76	131	155	55	457	3.24	1.13	

Table 4.1. (cont)

*****NAWCADTRN EMPLOYEES*****									
*CONSTRUCT	RESPONSES FOR EACH CONSTRUCT ALONG WITH					MEANS	# OF RESP	MEAN	STN DEV
*-PERSPECTIVE	QUES #	1	2	3	4	5			
*PERFORMANCE ASSESSMENT									
*INDIVIDUAL									
	22)	9	8	23	44	33	117	3.72	1.17
	56)	6	11	22	47	17	113	3.51	1.03
totals		15	19	55	91	50	230	3.62	1.11
*NAPC									
	23)	12	25	41	31	7	116	2.97	1.07
	57)	12	22	38	28	10	114	2.97	1.13
totals		25	50	79	59	17	230	2.97	1.10
*RECOGNITION & REWARD									
*INDIVIDUAL									
	24)	25	20	35	30	6	116	2.76	1.20
	25)	21	23	23	30	8	115	2.75	1.22
	26)	28	26	26	18	6	114	2.46	1.17
	58)	19	20	21	12	18	117	2.74	1.26
	59)	25	26	17	14	4	113	2.84	1.19
	60)	25	17	23	25	4	114	2.81	1.23
totals		174	152	155	149	59	689	2.66	1.29
*NAPC									
	27)	33	27	37	11	4	112	2.34	1.11
	28)	22	31	35	17	8	113	2.63	1.16
	61)	10	28	42	23	12	115	2.99	1.10
	62)	22	32	32	21	10	117	2.70	1.21
totals		87	118	146	72	34	457	2.67	1.17
*EMPLOYEE INVOLVEMENT									
*INDIVIDUAL									
	29)	8	13	22	46	28	117	3.62	1.16
	63)	11	11	22	28	44	117	3.71	1.21
totals		19	24	45	74	72	234	3.67	1.24
*NAPC									
	30)	14	25	46	24	7	116	2.87	1.06
	64)	16	13	48	27	11	115	3.03	1.13
totals		30	38	94	51	18	231	2.95	1.10
*PERFORMANCE IMPROVEMENT									
*INDIVIDUAL									
	31)	15	19	27	36	19	116	3.22	1.26
	65)	6	12	22	30	26	116	3.67	1.09
totals		21	31	49	86	45	232	3.44	1.20
*NAPC									
	32)	15	18	37	37	9	116	3.06	1.14
	66)	6	15	32	44	20	117	3.49	1.08
totals		21	33	69	81	29	233	3.27	1.13
*IND. PERF AWARD SYS									
*INDIVIDUAL									
	33)	29	31	33	19	3	115	2.44	1.11
	34)	16	24	22	28	27	115	2.77	1.25
	67)	16	13	24	28	19	114	2.79	1.22
totals		61	68	90	82	43	344	2.94	1.28
*NAPC									
	68)	10	15	42	29	14	110	3.20	1.11
totals		10	15	42	29	14	110	3.20	1.11

Table 4.2. Management Survey Results

#	1	2	3	4	5	# OF RESP	MEAN	STN DEVT
1)	0	0	0	5	17	22	4.77	0.42
2)	0	1	1	10	12	22	4.50	0.58
3)	0	1	1	10	12	22	4.75	0.88
4)	0	0	1	10	11	22	4.95	1.11
5)	0	0	0	10	12	22	4.55	0.67
6)	0	0	0	10	10	22	4.36	0.64
7)	0	0	0	10	11	22	4.89	0.92
8)	0	0	0	10	11	22	4.73	0.85
9)	0	0	0	10	11	22	4.95	0.99
10)	0	0	0	10	10	22	4.73	0.78
11)	0	0	0	10	10	22	4.73	0.99
12)	0	0	0	10	10	22	4.77	0.85
13)	0	0	0	10	10	22	4.77	0.85
14)	0	0	0	10	10	22	4.77	0.85
15)	0	0	0	10	10	22	4.77	0.85
16)	0	0	0	10	10	22	4.77	0.85
17)	0	0	0	10	10	22	4.77	0.85
18)	0	0	0	10	10	22	4.77	0.85
19)	0	0	0	10	10	22	4.77	0.85
20)	0	0	0	10	10	22	4.77	0.85
21)	0	0	0	10	10	22	4.77	0.85
22)	0	0	0	10	10	22	4.77	0.85
TOTALS	112	217	302	558	293	1482	3.47	1.18
		yes	no			total	x	yes
69)		8	13			21		0.38
70)								
weight	dollars	# of yes				wt. x # of yes		
1.00	100	3			3			
2.00	500	0			0			
3.00	750	0			0			
4.00	1000	4			16		weighted	
5.00	1500	1			5		mean	
6.00	2500	1			6		4.33	
7.00	5000	2			14		=approx.	
8.00	10000	1			8		\$1165	
total	\$0	12				52		

Table 4.2. (cont)

CONSTRUCT -PERSPECTIVE	QUES #	NAWCADTRN MANAGEMENT					# OF RESP	MEAN	STN DEV
		RESPONSES FOR EACH CONSTRUCT ALONG WITH MEANS							
		1	2	3	4	5			
<b>INTRINSIC INDIVIDUAL</b>									
	1)	0	0	0	5	17	22	4.77	0.42
	2)	0	0	0	9	15	25	4.50	0.58
	3)	0	0	4	14	3	21	4.59	0.49
	36)	3	5	10	27	43	88	2.77	1.04
	totals	3	5	10	27	43	88	4.16	1.05
<b>NAPC</b>									
	3)	0	0	4	14	3	21	3.95	0.58
	totals	0	0	4	14	3	21	3.95	0.58
<b>EXTRINSIC INDIVIDUAL</b>									
	4)	3	9	3	3	3	21	2.71	1.28
	5)	2	7	2	1	3	22	2.73	1.25
	37)	13	23	9	9	9	65	1.84	0.85
	38)	19	23	9	9	9	65	2.35	1.25
	totals	7	11	2	2	0	22	1.95	0.88
<b>NAPC</b>									
	5)	7	11	2	2	0	22	1.95	0.88
	totals	7	11	2	2	0	22	1.95	0.88
<b>INDIVIDUAL INDIVIDUAL</b>									
	6)	1	5	5	4	6	21	3.43	1.26
	7)	1	7	11	3	0	22	3.73	0.75
	39)	6	9	11	11	0	35	2.57	1.09
	40)	10	8	11	11	0	35	2.87	0.85
	totals	18	29	21	13	6	87	2.54	1.17
<b>NAPC</b>									
	8)	1	5	4	9	3	22	3.36	1.11
	41)	7	14	3	2	4	22	2.14	1.10
	totals	8	14	7	11	4	44	2.75	1.26
<b>GROUP INDIVIDUAL</b>									
	9)	1	4	3	12	2	22	3.45	1.03
	10)	2	5	4	10	1	22	3.14	1.10
	42)	0	0	0	6	14	25	4.32	0.66
	43)	0	0	0	16	10	25	4.25	0.50
	totals	3	9	9	40	27	88	3.90	1.06
<b>NAPC</b>									
	11)	0	4	12	6	0	22	3.09	0.67
	44)	0	0	3	12	7	22	4.18	0.65
	45)	0	0	1	9	11	21	4.48	0.59
	totals	0	4	16	27	18	65	3.91	0.87
<b>PERFORMANCE OPPORTUNITIES INDIVIDUAL</b>									
	12)	0	1	6	9	6	22	3.21	0.85
	13)	0	1	1	10	10	25	4.36	0.64
	46)	0	2	9	9	11	22	4.36	0.77
	totals	0	2	9	28	27	66	4.21	0.79
<b>NAPC</b>									
	14)	1	1	2	14	4	22	3.86	0.92
	47)	0	3	6	9	5	22	3.77	0.90
	totals	1	3	8	23	9	44	3.82	0.91
<b>BEHAVIORS EXHIBITED INDIVIDUAL</b>									
	15)	1	0	0	6	15	22	4.55	0.89
	18)	1	2	3	8	9	22	3.73	1.09
	48)	0	3	6	22	8	22	3.95	0.88
	49)	2	3	11	22	28	66	4.08	1.02
	totals	2	3	11	22	28	66	4.08	1.02
<b>NAPC</b>									
	16)	1	0	3	16	2	22	3.82	0.78
	50)	0	0	6	12	4	22	3.91	0.67
	totals	1	0	9	28	6	44	3.86	0.73
<b>PERFORMANCE MEASURES INDIVIDUAL</b>									
	17)	0	2	1	9	10	22	4.23	0.90
	18)	1	4	0	8	9	22	3.91	1.24
	19)	0	1	6	13	2	22	3.73	0.69
	51)	0	1	4	9	8	22	4.09	0.85
	52)	0	5	6	8	2	22	3.23	1.04
	53)	0	3	8	8	8	33	3.50	0.89
	totals	2	16	25	55	34	132	3.78	1.01
<b>NAPC</b>									
	20)	0	2	9	11	0	22	3.41	0.65
	54)	1	4	9	11	1	22	3.77	0.90
	55)	1	4	9	11	1	21	3.23	1.00
	totals	3	14	31	34	5	87	3.28	0.92

Table 4.2. (cont)

NAWCADTRN MANAGEMENT										
CONSTRUCT -PERSPECTIVE	QUES #	RESPONSES FOR EACH CONSTRUCT ALONG WITH MEANS					# OF RESP	MEAN	STN DEV	
		1	2	3	4	5				
PERFORMANCE ASSESSMENT										
INDIVIDUAL										
totals	22) 56)	1 1	0 1	4 11	9 22	8 9	22 44	4.05 3.84	0.98 0.85	
NAPC										
totals	23) 57)	0 0	6 8	9 20	6 14	1 2	22 44	3.09 3.23	0.85 0.79	
RECOGNITION & REWARD										
INDIVIDUAL										
totals	24) 25) 26) 58) 59) 60)	6 3 0 11 7	5 5 4 3 3	4 2 2 2 2	4 6 7 11 5	2 6 3 1 1	21 21 20 22 21 21	2.57 3.29 3.10 3.59 2.18 2.86	1.33 1.55 1.34 0.94 1.37 1.55	
NAPC										
totals	27) 28) 61) 62)	3 0 1 1	5 3 3 5	8 10 7 6	4 9 9 10	0 0 3 3	20 20 22 22	2.65 2.62 3.50 3.14	0.96 0.69 0.99 0.92	
EMPLOYEE INVOLVEMENT										
INDIVIDUAL										
totals	29) 63)	0 0	2 4	0 2	9 23	11 15	22 44	4.32 4.11	0.87 0.86	
NAPC										
totals	30) 64)	0 1	3 5	10 13	7 18	2 7	22 44	3.36 3.57	0.83 0.96	
PERFORMANCE IMPROVEMENT										
INDIVIDUAL										
totals	31) 65)	1 1	4 6	3 4	10 22	4 11	22 44	3.55 3.82	1.12 1.03	
NAPC										
totals	32) 66)	0 0	3 6	5 5	14 27	0 6	22 44	3.50 3.75	0.72 0.86	
IND. PERF AWARD SYS										
INDIVIDUAL										
totals	33) 34) 67)	1 4 0	7 4 1	8 5 8	6 5 9	0 2 2	22 20 22	2.86 2.85 2.73	0.87 1.28 0.81	
NAPC										
totals	68)	0	6	7	9	0	22	3.14	0.81	

No constructs were found to be comparable. The average difference for the NAWCADTRN sample was less than 11% with a range from 1% to 42% for certain questions.

The second survey located was also an organizational culture survey, developed by the Naval Personnel Research and Development Center (NPRDC). This survey was distributed to all employees of an unknown naval aviation depot (NADEP) that was part of the NAST. There was about a 60% response rate (1500 surveys returned). The workforce mix of a NADEP is very similar to that of NAWCADTRN and is a good candidate to help validate the gainsharing survey. There were fourteen (14) questions from this survey that were used for this validation exercise. These results show the average question difference being less than 10%, ranging from 3% to 28% for individual questions. For the similar constructs, which were: Employee Involvement, Group Focus, Performance Improvement Focus, and Rewards and Recognition, the differences only were: 15%, 25%, 12%, and 3%, respectively.

The Quality Orientation Profile (QOP) was distributed to NAWCADTRN and was mentioned as a survey validation source in section 3.5.1. This survey was developed by Wilson Learning, who recently went out of business. Data on four similar constructs was located, but results for individual questions could not be found. The answers were on a scale from 1-100, so the results were normalized to a 1-5 scale. The average construct difference was about 16%. The gainsharing constructs and their survey scores are compared with the QOP normalized scores below.

<u>GS Construct</u>	<u>Surv Score</u>	<u>Similar QOP Construct</u>	<u>Real Score</u>	<u>Norm. Score</u>	<u>Av. % diff.</u>
Group	3.50	Shared Respons.	56	2.95	14%
		Cross Team Align.	61	3.05	

Individual	2.56	Team Orientation	29	1.45	34%
		Peer Support	38	1.90	
Rew. & Rec.	2.66	Defining Rewards	53	2.65	9%
		Providing Conseq.	59	2.95	
		Peer Recognition	62	3.10	
Perf. Impr.	3.36	Providing Resources	61	3.05	8%
		Mgmt Support	63	3.15	

The overall question difference for the three surveys was approximately 10% and the construct difference was about 15%. These results show consistency between the surveys and thus, help validate the survey. The raw data for the surveys mentioned and their relation to the gainsharing survey are shown in Appendix G.

#### 4.1.6 Comments

At the end of the survey there was a space for comments. The respondents had many comments which needed to be integrated into the survey analysis in some way. This section outlines a medium value-added version of the respondents' comments. The raw comments were categorized by topic area. Some comments were edited and summarized so they would be more concise and readable, but did not change meaning. Some respondents had comments that were separated into more than one category. The categories were listed in order, based on the frequency of comments pertaining to that area are shown below, in decreasing order of frequency mentioned.

- performance awards and appraisal process
- equal rewards
- intrinsic motivation
- basic pay and benefits



- survey feedback
- employee involvement
- NAWCADTRN praise
- improvements to incentives
- communication
- size of payouts

The specific survey comments are shown in Appendix H.

## 4.2 Interviews

Interviews were conducted with four separate groups to validate the general gainsharing model and specify it for a government, RDT&E facility. This section outlines the data collected and the methods used.

### 4.2.1 Distribution and Collection

Four people were selected to represent each of the four groups explained in section 3.1.2.1. This listing of people and the reasons why they were selected are shown on the next few pages in Table 4.3. All groups were sent a copy of the general gainsharing model, depicted in section 2.9, and a listing of the questions to be asked at the interview. All groups were interviewed over the phone, except NAWCADTRN Management, which was done in person. The interviews lasted on average about 1 hour.

Each person interviewed was carefully selected, so that the group would be properly represented. The NAWCADTRN Management group contained a supervisor from: Corporate Management, Personnel, Technology Engineering, and Plant Engineering. These four managers provided a well-rounded view of NAWCADTRN operations. The groups of sponsors was comprised of three of the main funding sources from the Naval Air Systems Command (NAVAIR) and represented the three major types of work that

Table 4.3. Interview List

Name	Position	Organization	Phone#	Background
<b>NAWCADTRN Management</b>				
Lary Palcza	Director, Corporate Management	Code 07A NAWCADTRN P.O. Box 7176 Trenton, NJ 08628	(609) 538-6874 fax -6532	strategic planning, budgeting/fiscal planning, customer interface, capital investment, and management systems
Fred Olson	Department Head, Personnel	Code HR NAWCADTRN	(609) 538-6613	personnel policy, administrative systems, incentives
Ted Elsasser	Department Head, Science & Technology	Code PE3 NAWCADTRN	(609) 538-6838	propulsion technology development, sponsor interface, marketing programs, DOD liaison
Marty Dell	Department Head, Plant Operations	Code OP NAWCADTRN	(609) 538-6790	production, design, manager of largest department at NAWCADTRN consisting of blue and white collar employees, past TQM coord., has gainsharing experience
<b>NAWCADTRN Support</b>				
Marcio Duffles	Program Manager, Science & Technology	NAVAIR AIR-536TA 1421 Jefferson Davis Hwy Arlington, VA 22243-5360	(703) 604-3290, x7852 fax -3757	propulsion technology development, advanced systems, funded \$2.6M last 2 years, will fund \$3.0M next 2 years
Doug Mearns	Program Manager, Fuel Systems Support	NAVAIR AIR-53623C	(703) 604-3290, x7856	fuels and lubricants fleet support, fuel systems funded \$2.0M last 2 years, will fund \$1.5M next 2 years
Dan Squire	Program Manager, F414 Engine	NAVAIR AIR-536161	(703) 604-3293, x7801	engine acquisition, engine testing funded \$8.8M last 2 years, will fund \$13.4M next 2 years
Tony Borrego	Program Manager, Expendable Engines	OC-ALC/LPARR 3001 Staff Dr. Tinker AFB, OK 73145-3031	(405) 736-3484 fax -4120	Air Force engine qualification testing, fleet support funded \$1.1M last 2 years, will fund \$1.4M next 2 years

Table 4.3. (cont)

<b>Gainsharing Organizations</b>				
Mark Hoffman	TQM Coordinator	Fleet & Industrial Supply Center Code OQ Oakland, CA 94625-5000	(510) 302-6841 fax -5019	gainsharing had: equal shares, measured performance of 6 departments, overall quality measure impacting payouts, evaluation of gainsharing each year, government service organization
Bill Sadler	Gainsharing Coordinator	NADEP PSC Box 8021 Code 099 Marine Corps Air Station Cherry Point, NC 28533-0021	(919) 466-7096 fax -7256	gainsharing had: productivity measurement, quality index, QMB structure, yearly employee evaluation, made many payouts, large government production organization
Vickie Peterson	Gainsharing Coordinator	Herman Miller, Inc. 855 E. Main St. Zeeland, MI 49464	(616) 654-3316 fax -3632	gainsharing system measured labor/material savings and customer service, many PATs and a QMB structure, committee for implementation and evaluation, had a quarterly bonus, and a suggestion system, they are a private-sector, mid-size manufacturing/showroom company
Hartley J. Arstia	Director of Human Resources and Gainsharing Coordinator	Eggers Industries 1819 E. River St. Two Rivers, WI 54241	(414) 793-1351, x226 fax -2958	had a piece-work plan, switched to gainsharing with: QMB structure, measure profit-margin, feasibility assessment and employee vote, results published quarterly, they are a small private-sector co. that manufactures/distributes custom plywood

Table 4.3. (cont)

<b>Gainsharing Experts</b>					
Jay Schuster	Compensation Consultant	Schuster & Zingheim 3731 Wilshire Blvd. Los Angeles, CA 90010	(213) 252-9255 fax -9257	extensive research on organizational incentive systems, focused a lot on gainsharing, runs a consulting business for corporate compensation design, wrote a book entitled "The New Pay," recommended as an expert by Ed Lawler from the Center for Effective Organizations	
Tim L. Ross	Gainsharing Consultant	Ross Gainsharing Institute P.O. Box 4760 Chapel Hill, NC 27515	(919) 929-2997 fax -2844	published extensive articles on gainsharing and a book entitled "Gainsharing", very pragmatic view of gainsharing measurement and implementation, runs a consulting business for gainsharing, recommended by committee member	
John G. Belcher	Gainsharing Consultant	J.G. Belcher & Associates 3050 Post Oak Blvd. Suite 470 Houston, TX 77056	(713) 627-7042 fax -	extensive incentive/gainsharing work with many companies, wrote a fairly new book entitled "Gain Sharing," renowned in gainsharing community, recommended by Carla O'Dell from APQC	
Paul Rossler	Professor	Department of Industrial Engineering Oklahoma State University 322 Engineering North Stillwater, OK 74078	(405) 744-9131 fax -6055	did thesis and dissertation on gainsharing, conducted research and did consulting in compensation and performance measurement, teaches courses in compensation and performance improvement at OSU	

NAWCADTRN performs (which are R&D, Acquisition/Test, and Fleet support). There was also one Air Force Sponsor. NAVAIR supplies 80% of NAWCADTRN funding, other Navy about 10%, and non-Navy supplies the remaining 10%, so this was a fairly representative sample for the third group. Two Navy facilities (one production and one service) and two private sector organizations (both production) were chosen because they were organizations with considerable gainsharing experience. In all cases, the person in charge of gainsharing coordination was interviewed as the representative from their organization. And finally to compile the gainsharing expert group, four prevalent authors were chosen that have written on both theoretical and practical issues related to gainsharing.

#### 4.2.2 Responses

All results for each interview group were combined using the tally sheets, shown in Appendix E. A low value-added version of the interview results is shown in Table 4.4 for the four different groups.

### 4.3 Documentation

Additional supporting data was gathered through various documents dealing with performance measurement and the present incentive system at NAWCADTRN. This information will help define specific gainsharing issues, but mostly it will be of value to a gainsharing design team trying to further develop the general gainsharing model for their specific purpose. It also provides some information specific to a RDT&E organization.

#### 4.3.1 Measurement

There were two measurement areas (process and customer satisfaction) identified that are in use at NAWCADTRN or are being examined for future use.

Table 4.4. Interview Results by Model Parameter

Inter-viewee	1) Funding Source	2) Distribution	3) Performance Measurement	4) Employee Involvement	5) Integration
<b>NAWCADTRN Management</b>	<ul style="list-style-type: none"> <li>- need to redefine regs., any money used is public money subject to a lot of scrutiny</li> <li>- pres. pot of 1% is low for gov. facilities, need bigger pot to be equitable</li> <li>- define how big pot must be first, then get \$</li> <li>- to use savings, sponsor must be fully supportive</li> <li>- could supply pot via usage fee, where a % is taken from each program, need sponsor advocacy</li> </ul>	<ul style="list-style-type: none"> <li>- can't use left over money</li> <li>- everyone must be involved at the O-level</li> <li>- favors equitable distribution</li> <li>- also should dist. to high perf. groups</li> <li>- NAWCADTRN is a highly political org., must have perception of fairness, for GS to be accepted</li> <li>- ind. getting an appraisal should get recognition outside GS</li> </ul>	<ul style="list-style-type: none"> <li>- need PMs so people don't expect bonuses</li> <li>- there is little competition for NAWCADTRN, the gov. is moving away from comp. and more towards contracting out</li> <li>- inflating budgets to up savings is a concern, especially with no comp.</li> <li>- very difficult to measure quality and employee contribution at TRN</li> <li>- facility utilization is a reliable measure</li> <li>- measure all aspects of the business, don't sub-optimize</li> </ul>	<ul style="list-style-type: none"> <li>- higher performing groups may just have more opportunity and know better what is expected</li> <li>- employees should design and implement the system, use a cross-section of people including union and management</li> <li>- employees shouldn't decide on group payouts, must be objective, could have a peer review process for feedback only</li> </ul>	<ul style="list-style-type: none"> <li>- 30% always get awards and 30% never get them in present system, design so GS changes this</li> </ul>
Larry Palzca					

Table 4.4. (cont)

<p>Fred Olson</p>	<ul style="list-style-type: none"> <li>- with budget reductions it's hard to keep a constant money supply for GS</li> <li>- savings and existing incentives can be used</li> <li>- taking from budget is stable and logical and provides long-term funding</li> </ul>	<ul style="list-style-type: none"> <li>- all employees including support groups must be involved</li> <li>- distribute only at the O-level to foster a team environment</li> <li>- geographically diverse orgs. may require separate systems for each facility</li> <li>- group and individuals must be recognized by other systems</li> </ul>	<ul style="list-style-type: none"> <li>- shared fate is best approach</li> <li>- measures must be directly tied to GS payouts; keep quantitative</li> <li>- measure: goals, customer feedback, test hours, and safety, then weight and put into (1) final score; compare w/ previous data</li> <li>- could measure an org. based on mission/vision and depts. based-on the supervisor's performance objectives</li> </ul>	<ul style="list-style-type: none"> <li>- don't want employees to decide payouts because of perceived unfairness</li> <li>- you should have the highest level of EI that is practical, most likely a representative team to design and monitor the system</li> </ul>	<ul style="list-style-type: none"> <li>- review process yearly to improve</li> <li>- establish a permanent function to administer the system</li> <li>- copy a model GS program, then tweak based on evaluation results</li> <li>- get the word out early and often when starting the system</li> <li>- kickoff EI early, then measures</li> </ul>
<p>Ted Elsasser</p>	<ul style="list-style-type: none"> <li>- many projects last for years, may have to wait too long for savings</li> <li>- could over bid on projects to up savings</li> <li>- existing incentives are easy to tap</li> <li>- could add OH item to budget for GS</li> <li>- general process improvements can be self-funding</li> </ul>	<ul style="list-style-type: none"> <li>- hard to separate each individual's contribution, so can't use ind. payout</li> <li>- group dist. can work and O-level is the simplest</li> <li>- need to dist. enough \$ or employees might lose interest</li> </ul>	<ul style="list-style-type: none"> <li>- establish measures of what is good and tie directly to payouts</li> <li>- O-level measures must be objective, group measures can be subjective</li> <li>- larger projects are more visible, thus have a greater chance of a group share, which could be unfair</li> </ul>	<ul style="list-style-type: none"> <li>- EI in design is necessary; a team could define ground rules for GS</li> <li>- use a contractor to implement</li> <li>- establish a formal function to monitor and manage the system</li> </ul>	<ul style="list-style-type: none"> <li>- early education on GS is necessary</li> <li>- could use an employee vote to get initial buy-in</li> <li>- start system small, so any inequities won't be that visible, then build and correct problems</li> <li>- could start GS in a org sub-element, then grow to other departments</li> <li>- establish a team to evaluate the system</li> </ul>

Table 4.4. (cont)

<p>Mary Dell</p>	<ul style="list-style-type: none"> <li>- savings are hard to justify in developmental projects, they are highly unstructured and have no standards</li> <li>- present incentive pot of 1% is too small, can use this a base to start GS</li> <li>- competition with industry for engine tests may not work, they are sometimes willing to under bid a test to keep their facilities operating and make it up on production runs</li> <li>- could use a tax for capital improvements, this could free up some OH for GS, which is how present incentives are funded; this will look better to customers</li> </ul>	<ul style="list-style-type: none"> <li>- reward equally to all in the organization</li> <li>- team and individual recognition should come from a different pot</li> <li>- reward employees only on their contribution</li> <li>- imaginary OH charge could be disputed, it may lower payouts</li> </ul>	<ul style="list-style-type: none"> <li>- measures must be tied directly to payouts</li> <li>- can measure: test hours, productivity ratio, and test reports</li> <li>- use management and customer surveys to get perf. feedback</li> <li>- develop thorough database of past measures for baseline</li> </ul>	<ul style="list-style-type: none"> <li>- no EI for group payouts</li> <li>- could survey employees to get their input on their GS preferences and have mgmt. develop guidelines for system, then pass to employee team for detailed development</li> </ul>	<ul style="list-style-type: none"> <li>- the designers should also be the implementors</li> <li>- employees should implement, with union and customer cooperation</li> <li>- the TQM office should administer the system</li> <li>- conduct an employee vote and have town meetings to increase awareness</li> <li>- implement performance measures first to develop standards</li> </ul>
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Table 4.4. (cont)

<b>NAWCADTRN Sponsors</b>					
<p>Marcio Duffles</p>	<ul style="list-style-type: none"> <li>- all four sources are viable for the test operations side</li> <li>- savings are not appropriate for the engineering side</li> <li>because budget estimates for sponsors might get inflated</li> <li>- % from budget is acceptable, if money can be returned to sponsor when performance is below sponsor's standards</li> </ul>	<ul style="list-style-type: none"> <li>- group shares are effective for testing and individual shares better for engineering side</li> <li>- O-level dist. should be used also</li> <li>- productivity school is favored</li> <li>- equitable distribution is favored</li> </ul>			
<p>Doug Mearns</p>	<ul style="list-style-type: none"> <li>- testing is easier to define savings, R&amp;D is hard to set concrete standards very subjective</li> <li>- sponsors trust validity of budgets, not inflated</li> <li>- any savings will lower next year's budget</li> <li>- target savings could be used only with large-scale engine tests</li> <li>- existing incentives can be used</li> </ul>	<ul style="list-style-type: none"> <li>- shared fate is favored</li> <li>- O-level and group payouts could work, make individual dist. through other channels</li> <li>- difficult to differentiate between vastly different functions</li> </ul>			

Table 4.4. (cont)

<p>Dan Squire</p>	<ul style="list-style-type: none"> <li>- funding the GS system is biggest hurdle</li> <li>- 5% of total budget is appropriate for incentives</li> <li>- taking a percent of each project is OK, the present incentive system is similar to this</li> <li>- can't use savings with no competition because it could be gamed, if there is competition it's OK</li> </ul>	<ul style="list-style-type: none"> <li>- use a group distribution, with small individual component</li> <li>- no O-level, its too removed from the employee</li> <li>- need to define an individual's primary teams and reward them as a member of each team</li> <li>- need separate distribution for the support staff</li> </ul>	<ul style="list-style-type: none"> <li>- distribute based on a subjective assessment of whether goals were met, a perf. monitoring team could do this</li> <li>- measures that are too quantitative run the risk of sub-optimizing, especially in R&amp;D which is dynamic</li> <li>- should have customers, management, and peers judge performance</li> </ul>		
<p>Tony Borrego</p>	<ul style="list-style-type: none"> <li>- most projects are over a year in length, may have to pull estimated savings out periodically</li> <li>- savings is a good source, but they are uncertain and short-term</li> </ul>	<ul style="list-style-type: none"> <li>- distribute based directly on measures</li> </ul>	<ul style="list-style-type: none"> <li>- combing separate but similar efforts to take advantage of economies of scale can save overall organization dollars</li> </ul>		

Table 4.4. (cont)

<b>Globalizing Representatives</b>					
Mark Hoffman	<ul style="list-style-type: none"> <li>- can't preload the system, use only proven savings for system</li> <li>- can use existing pot as a supplement on payouts</li> <li>- only real savings would be considered</li> <li>GS, target savings is OK</li> </ul>	<ul style="list-style-type: none"> <li>- dist. only at the O-level</li> <li>- have a group and ind. component with other systems</li> </ul>	<ul style="list-style-type: none"> <li>- use productivity measures for savings, then index with quality measures</li> <li>- measures must directly drive payouts, also use measures to adjust pot and as a validity check</li> <li>- hard to equitably measure each group's contribution</li> <li>- to avoid sub-optimization stick to O-level and use shared fate</li> </ul>	<ul style="list-style-type: none"> <li>- heavy EI for design and development, along with evaluation of system</li> <li>- must already have existing EI structure for improving processes</li> </ul>	<ul style="list-style-type: none"> <li>- EI comes first, then set up performance measures, they will in turn drive the funding source</li> </ul>

Table 4.4. (cont)

<p>Bill Sadler</p>	<ul style="list-style-type: none"> <li>- can have HQ increase your incentive pot and use for GS, recommends 3-4% of payroll (3-4x increase)</li> <li>- could get authorization to increase pot if there are significant savings in excess of available pot</li> <li>- believes all (4) sources could be used</li> <li>- always new and different workload at depots which lower standards, thus there is room to improve and produce new savings</li> <li>- org. could take money out of budget for GS to supply initial payouts</li> </ul>	<ul style="list-style-type: none"> <li>- their system had a line item for GS in their budget, CO gave all a special act award to make the GS payout</li> <li>- program savings are returned to customer, can't dist. these funds either, but draw out of incentive pot for GS</li> <li>- all left over incentives are returned to HQ Comptroller at year end</li> <li>- a group share can be used, if groups are autonomous</li> <li>- indiv. recognized through a separate system</li> <li>- everyone should have equal O-level GS shares</li> <li>- should have separate checks for GS, non-electronic</li> </ul>	<ul style="list-style-type: none"> <li>- justify drawing on incentive pot with savings from programs</li> <li>- measures must be legitimate and accurate to justify distributions</li> <li>- measure at the project level also to create identity</li> <li>- some plants are designed to lose money, less money lost could actually be viewed as a gain</li> <li>- use leveling factors like quality or customer satisfaction that modify payouts (up or down) to reinforce corporate priorities</li> </ul>	<ul style="list-style-type: none"> <li>- use customer survey to provide feedback on improvements required, let employees take action to correct</li> <li>- involve employees in design and development, especially blue-collar, they are non-paper work people, more cynical, and feel less control of a perceived paper system like GS</li> <li>- have QMBs throughout the org. chartered for continuous improvement</li> <li>- involve unions in setting ground rules</li> </ul>	<ul style="list-style-type: none"> <li>- conduct short training for all employees and more extensive for managers</li> <li>- system must be legal, mgmt. could be disciplined for misuse of public funds</li> <li>- start with EI, then measure, then activate bonus</li> </ul>
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Table 4.4. (cont)

<p>Vickie Peterson</p>	<ul style="list-style-type: none"> <li>- profit gains provide pool</li> <li>- balanced funding source required to avoid sub-optimization</li> <li>- process improvements should add \$ to pot</li> </ul>	<ul style="list-style-type: none"> <li>- must meet goals in all measures to dist., if goals are exceeded there is more to dist.</li> <li>- O-level is the major share, but a small group dist. is feasible, if groups are autonomous</li> <li>- equitable dist. to all employees based on pay, including OT</li> <li>- separate system to recognize ind. contribution</li> </ul>	<ul style="list-style-type: none"> <li>- measure product and service quality via customer survey, also measure asset use</li> <li>- profitability is overall measure, along with cost savings</li> <li>- want measures to ensure equity for customers/shareholders/employees</li> <li>- about (5) objective measures are appropriate to keep system simple</li> </ul>	<ul style="list-style-type: none"> <li>- bonus system is only a component of an overall participative mgmt. plan</li> <li>- provide feedback to employees and have them act on it</li> <li>- EI for design of GS</li> </ul>	<ul style="list-style-type: none"> <li>- establish EI first, then measures</li> <li>- integration is the most difficult part</li> </ul>
<p>Hartley Arsta</p>	<ul style="list-style-type: none"> <li>- savings are best, they provide a self-funded source for GS</li> <li>- existing incentives may be tapped</li> <li>- can't use a % of budget, unless measures are very thorough</li> </ul>	<ul style="list-style-type: none"> <li>- O-level dist. is best, group is OK for large organizations</li> <li>- hard to distinguish ind. contribution</li> <li>- dist. based on earnings</li> </ul>	<ul style="list-style-type: none"> <li>- should account for new equipment in bonus</li> <li>- use quality measures to index payouts</li> </ul>	<ul style="list-style-type: none"> <li>- formal EI critical at start, then informal EI can take over</li> <li>- employees part of designing system by providing input through proper channels</li> <li>- have employee vote or survey to get their input</li> <li>- no EI in payout decisions</li> <li>- need EI for improvement and for GS</li> </ul>	<ul style="list-style-type: none"> <li>- EI first, then measures, then bonus will result</li> <li>- have awareness meetings early in the development process</li> </ul>

Table 4.4. (cont)

<b>Calculating Experts</b>					
<p>Jay Schuster</p>	<ul style="list-style-type: none"> <li>- all four sources are viable, but cost savings is best</li> <li>- can give bonuses based on org. or group goal achievement, taken out of budget</li> </ul>	<ul style="list-style-type: none"> <li>- GS is team-oriented, so no individual component</li> <li>- use only O-level payouts initially, to minimize competition</li> </ul>	<ul style="list-style-type: none"> <li>- measures should be linked to the organization's strategic initiatives</li> <li>- cost savings and productivity measures complement GS and are self-funding</li> <li>- use only quantitative measures early, then phase in qualitative when org. becomes more comfortable with GS</li> </ul>	<ul style="list-style-type: none"> <li>- management will define system goals with help from consultants</li> <li>- task force of employees will further develop plan</li> </ul>	<ul style="list-style-type: none"> <li>- integrate GS with overall incentive policy</li> <li>- benchmark your GS system with other systems</li> </ul>
<p>John Belcher</p>	<ul style="list-style-type: none"> <li>- almost all GS systems are self-funded by broad measures like savings or profitability, not many simply take from budget</li> <li>- savings tend to be to short-term</li> <li>- labor costs are becoming a smaller portion of an org's budget, these potential savings are shrinking</li> <li>- 50% of all companies and 100% of government orgs. issue bonuses; use this pot instead for GS</li> </ul>	<ul style="list-style-type: none"> <li>- distribute based on income because of fair labor law</li> <li>- size of pot will determine employee/org. ratio, also if GS is replacing some of base pay, pot will need to increase</li> <li>- cycle of the org. will determine the frequency of payouts</li> <li>- use group dist. only if org. is very large</li> </ul>	<ul style="list-style-type: none"> <li>- most GS systems index pot with modifiers like quality or customer satisfaction, which then drive payouts</li> <li>- most of the measures should be quantitative</li> <li>- GS could have one goal and if achieved, a predetermined amount is dist., which is somehow tied to the improvement</li> </ul>	<ul style="list-style-type: none"> <li>- establish involvement channels for employees to improve org.</li> <li>- difficult for employees to determine payouts, too much politics come into play</li> </ul>	<ul style="list-style-type: none"> <li>- model the system and run a simulation to test system and predict payouts to see if they can be afforded</li> <li>- EI first, then measurement</li> <li>- establish evaluation mechanisms for GS, can use surveys or focus groups</li> </ul>

Table 4.4. (cont)

<p>Tim Ross</p>	<ul style="list-style-type: none"> <li>- can use all (4) funding sources, existing pots don't work well though</li> <li>- bonuses should be about 5% of pay</li> </ul>	<ul style="list-style-type: none"> <li>- payouts don't have much relation to perceived success of system</li> <li>- could provide at most 1/3 of pot for group performance, but first start out organization-wide only</li> <li>- payout as a percentage of pay or use equal shares and adjust for time not worked</li> </ul>	<ul style="list-style-type: none"> <li>- measure relative to organization's priorities, tie these directly to payouts</li> <li>- could make system goal-oriented, can weight these to get a final score</li> <li>- relate non-self funding goals to a dollar impact on the org.</li> <li>- measure groups against their goals</li> </ul>	<ul style="list-style-type: none"> <li>- GS approach should be to put in an EI system with a bonus attached to it</li> <li>- EI system must be horizontal and vertical</li> <li>- employees can recognize or give token bonus to groups/ind. for high performance, but not as part of GS</li> </ul>	<ul style="list-style-type: none"> <li>- model for GS should explain and predict behavior and explain how system operates</li> <li>- establish EI, then measures</li> <li>- constantly evaluate and change system, especially the measures</li> <li>- evaluate system using surveys and interviews</li> <li>- have training for all in the beginning</li> </ul>
<p>Paul Rossler</p>	<ul style="list-style-type: none"> <li>- the (4) funding sources are all viable</li> </ul>	<ul style="list-style-type: none"> <li>- distribution must be meaningful, can't beat people over the head with the GS check</li> <li>- U.S. culture is largely ind., but GS is not</li> <li>- define level of solidarity to define if group dist. should be used</li> </ul>	<ul style="list-style-type: none"> <li>- external forces may be largest contributor to system success, should account these factors, hard to measure all that matters</li> <li>- measures must be simple and balanced, don't sub-optimize</li> <li>- difficult to tie measures to payouts</li> </ul>	<ul style="list-style-type: none"> <li>- need real EI in design and impl. of the system, work closely with mgmt.</li> <li>- must consider that all designers will have a vested interest in GS</li> <li>- don't force EI, some people may not want to be involved</li> </ul>	<ul style="list-style-type: none"> <li>- integration is most critical part subject to: politics, personalities, power, etc; we have no control over these</li> <li>- system must be specified to the org's specific context</li> </ul>

#### 4.3.1.1 Process Measures

The TQM office at NAWCADTRN did an audit of improvements resulting from process improvement teams and estimated the predicted cost savings. These improvements were process improvements occurring over a span of approximately two years and associated cost savings were predicted on a per year basis. These types of metrics could be used to measure work group performance and thus potentially define the payout/recognition a team might receive from GS. The list of metrics is shown in Appendix I.

Almost all of the cost savings from these efficiency improvements were measured in labor hour savings. Theoretically for the organization to benefit from all this "time saved," workers would use this new found free-time to take on more duties. Unfortunately, these types of figures tend to be more like "paper savings," meaning labor costs still remain constant and the same work is being accomplished. Thus, the organization is becoming more productive in a few select areas, while less productive in other unmeasured areas. Material and utility savings can be more easily declared as "real" savings. The total labor savings estimated from these interventions is 28,086 hours, which is about 14 man-years, or about 2% of the total labor budget at NAWCADTRN. Some material, utility, and contracted labor savings were estimated, but no dollar figure was given for these. To attempt to tie these savings into an award structure, these savings could provide justification for distribution of group awards. There is some guidance provided for monetary awards for improvements made by a group or individual resulting in real, quantifiable cost savings. It is recommended in personnel policy documents that the award be about 10% of the savings, up to a \$1000 award, then the percentage decreases. For improvements that can't be easily quantified, there is qualitative guidance given for the amount of awards to give. Thus, these types of process improvements apparently can justify organizational gainsharing bonus distributions.

#### 4.3.1.2 Customer Satisfaction



NAWCADTRN management makes use of a customer satisfaction survey to assess overall organization performance. This survey is very basic and asks customers (on a scale from 1-5, 5 being extremely satisfied) how satisfied they are with the following elements.

- 1) Overall program management/performance
- 2) Financial management
- 3) Responsiveness
- 4) Communications
- 5) Quality of technical product

Each element is also graded on its importance to that customer and most provide additional comments. Each customer's response is then matched to the supporting work team, so that groups can be identified as having excelled or floundered. The survey response rate averages about 70%. This survey could easily be incorporated into a gainsharing system as an organizational or group-level metric. The only problem is the customers that receive this survey supply direct funds, which comprise about 60% of the Center's budget. The customer supplying the indirect funding (remaining 40%) is a legislative body that provides funding for test facilities. This amount of funding is based on several high level measures and political pressures. The overall measure of their satisfaction could be viewed as the growth of NAWCADTRN's share of this facility funding pot. The customer's for the indirect work performed by functions such as Comptroller and Public Works are mostly internal, so a survey could be designed to capture internal customer satisfaction, with this type of work. There is another problem when groups might be overlooked for awards simply because their customer did not respond to the survey.

#### 4.3.2 Incentives

Documentation was collected pertaining to NAWCADTRN employee recognition and the

present incentive system to portray how employees are currently being rewarded.

#### 4.3.2.1 Recognition

A Center-wide Process Action Team (PAT) conducted a survey to assess employee preference with regard to recognition. Time-off was the highest preferred form of recognition. A chart showing the rankings of the different forms of recognition is shown on the following page in Figure 4.2. A point system for recognition was rated third, so a PAT was formed to design and implement a recognition system, of which this author was a member. A point system was established to recognize teams formed to make process improvements. These teams would receive points for accomplishing certain milestones and when the team's effort was completed, depending on the number of points accrued, they could pick out a gift.

This system had some success. Five teams completed their efforts and were rewarded and about 10 are still in process. Also in the employee survey distributed for this thesis effort, recognition ended up with fairly high marks. It is evident that recognition should be integrated into a gainsharing system for NAWCADTRN. This will be discussed in Chapter 5.

#### 4.3.2.2 Existing Incentives

Records for the 1991 and 1992 Performance Award System were reviewed and documented to determine if any distribution bias existed towards any particular population group. The reason these two years were selected is they were the only years (recently) where all the necessary data to do a comprehensive analysis could be located.

The data were categorized into management or non-management. Management was broken out further into WS and GM and non-management into: GS technical, GS non-technical, and Wage Grade. WS are the Wage Supervisors, representing the blue-collar

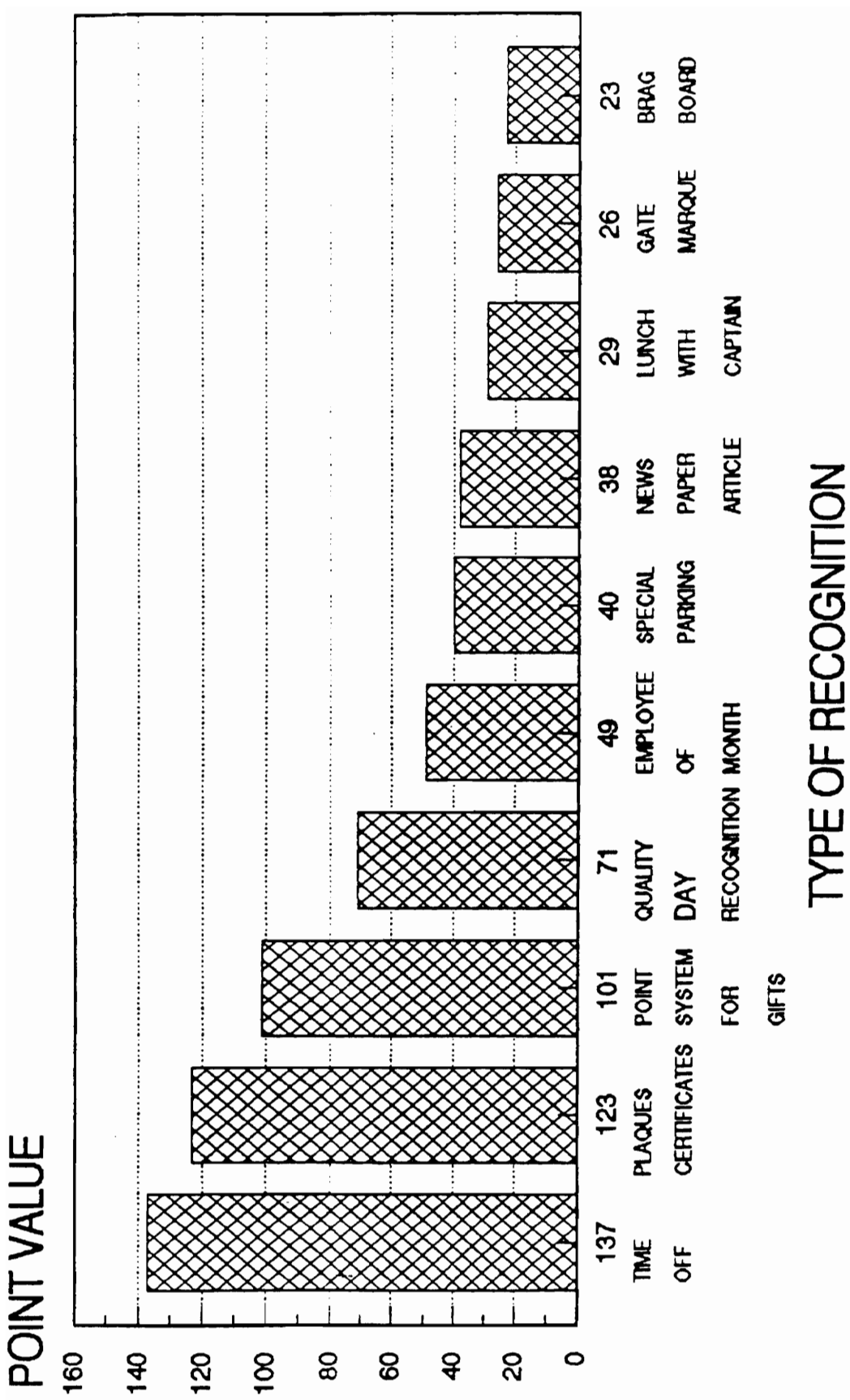


Figure 4.2. TQL Recognition Survey Results

management. The GM stands for General Management, which represents the white-collar management. GS, or General Schedule, are the white-collar employees consisting of technical employees (i.e., engineers and scientists) and non-technical employees (i.e., administrative and clerical). The Wage Grade (WG) category represents blue-collar employees. The 11 departments at NAWCADTRN were also compared to detect if any major inconsistencies existed in incentive awards distribution between the different departments. This is the extent of the breakout that could be performed because of the available data.

The following information was derived from this data. Dividing the total awards allocated to each group by the total number of people in that group will give you the equal share amount for that group. To adjust for different rates of pay, the equal share amount was divided by the average hourly rate for that group. This gives you a ratio representing the number of bonus hours that the average employee in that category would receive if the awards were distributed equally to everyone in that group. Bonus hours normalizes the relationship between the low and high paid groups because it signifies how many extra hours the average person in that group would have to work to earn the equal share payout that their group was given. For example, 40 bonus hours indicates that group distributed awards totalling one week's salary for each person in the group. This helped to determine if any inequities were present in awards allocated to the different groups being investigated. The percentage of people to receive awards and the average amount each recipient received was examined, to determine if any groups being ended to reward many people with a small amount or reward a few people with large amounts. The incentive data for FY91 and FY92 are shown on the subsequent two pages in Table 4.5, followed by an analysis of the following comparisons.

- Management (WS & GM) vs. Non-management (GS & Wage)
- Blue-Collar (WS) vs. White-Collar (GM) Management
- Non-Management Wage Graded (WG & others) vs. General Schedule (GS)
- Technical vs. Non-Technical General Schedule

Table 4.5. NAWCADTRN Incentive Data

***** YEAR1 INCENTIVE DATA *****													
CLASSIFICATION BREAKOUT	TOTAL \$ PAYOUT IN CATGRY	EQ. SHARE PAYOUT CATGRY	# OF FORPAYOUTS MADE	AVERAGE PAYOUT MADE	PEOPLE RECEIVING PAYOUTS	% OF PEOPLE TO REC. AWARD	AVERAGE ANNUAL AWARD	PEOPLE REC. MULT. PAYOUTS	TOTAL \$ OF MULT. AWARDS	AV. HOURLY RATE	BONUS HOURS		
MANAGEMENT													
WS	19,600	754	21	933	16	61.5%	1,225	4	8,000	\$15.03	50.16		
GM	34,878	997	16	2,180	14	40.0%	2,491	2	9,400	\$25.35	39.31		
MGMT SUB-TOTAL	54,478	893	37	1,472	30	49.2%	1,816	6	17,400	\$20.95	42.63		
NON-MANAGEMENT													
GS TECH	76,200	306	80	953	73	29.3%	1,044	6	10,100	\$17.32	17.67		
GS NON-TECH	66,000	550	106	623	96	80.0%	688	9	11,575	\$10.60	51.89		
GS TOTAL	142,200	385	186	765	169	45.8%	841	15	21,675	\$15.13	25.46		
WAGE	108,307	420	276	392	191	74.0%	567	57	49,141	\$11.67	35.97		
NON-MGMT SUB-TOTAL	250,507	400	462	542	360	57.4%	696	72	70,816	\$13.71	29.14		
TOTALS	304,985	443	499	611	390	56.7%	782	78	88,216	\$14.35	30.89		
DEPARTMENTAL BREAKOUT													
STAFF	12,136	17	11	1,103	11	64.7%	1,103	1	650	15.89	44.93		
CP	5,000	14	10	500	9	64.3%	556	2	2,700	12.12	29.47		
SE	5,500	18	14	393	12	66.7%	458			8.25	37.04		
SU	9,235	28	21	440	21	75.0%	440			9.71	33.97		
CR	5,900	16	10	590	10	62.5%	590			11.72	31.46		
PW	36,961	93	86	430	62	66.7%	596	19	18,736	13.42	29.61		
IS	48,997	118	72	681	57	48.3%	860	13	13,044	14.76	28.13		
OP	104,453	223	198	528	137	61.4%	762	37	42,486	13.08	35.81		
PE	5,200	5	5	1,040	4	80.0%	1,300	1	2,800	18.99	54.77		
PE2	31,525	78	27	1,168	26	33.3%	1,213	1	1,300	17.67	22.87		
PE3	40,078	78	45	891	41	52.6%	978	4	6,500	17.91	28.69		
TOTALS	304,985	688	499	611	390	56.7%	782	78	88,216	\$14.48	30.61		
***** TYPE OF AWARDS *****													
SUSTAINED PERF.	173,950												
SPECIAL ACT	85,975												
PMAR	23,778												
CREDO	13,800												
BENE SUG	7,482												
TOTAL	\$304,985												

Table 4.5. (cont)

YEAR2 INCENTIVE DATA													
CLASSIFICATION	TOTAL #	EQ. SHARE	# OF	AVERAGE	PEOPLE	% OF	AVERAGE	PEOPLE	REC. MULT.	TOTAL \$	AV.	BONUS	
BREAKOUT	OF PEOPLE	PAYOUT	FORPAYOUTS	MADE	RECEIVING	AWARD	ANNUAL	PAYOUTS	PAYMENTS	OF MULT.	HOURLY	HOURS	
	IN CATGRY	CATGRY	MADE		PAYMENTS	REC.	AWARD			AWARDS	RATE		
MANAGEMENT													
WS	10,900	28	389	11	991	10	35.7%	1,090	1	275	\$16.28	23.91	
GM	37,950	34	1,116	28	1,355	23	67.6%	1,650	5	12,383	\$26.53	42.07	
MGMT SUB-TOTAL	48,850	62	788	39	1,253	33	53.2%	1,480	6	12,658	\$21.90	35.98	
NON-MANAGEMENT													
GS TECH	86,252	296	291	107	806	98	33.1%	880	7	9,466	\$19.10	15.26	
GS NON-TECH	62,698	136	461	128	490	99	72.8%	633	20	20,283	\$11.43	40.33	
GS TOTAL	148,950	432	345	235	634	197	45.6%	756	27	29,749	\$16.69	20.66	
WAGE	84,946	257	331	296	287	207	80.5%	410	67	39,626	\$12.14	27.23	
NON-MGMT SUB-TOTAL	233,896	689	339	531	440	404	58.6%	579	94	69,375	\$14.99	22.65	
TOTALS	282,746	751	376	570	496	437	58.2%	647	100	82,033	\$15.56	24.20	
DEPARTMENTAL BREAKOUT													
STAFF	13,019	29	449	16	814	13	44.8%	1,001	3	6,825	15.71	28.58	
CP	7,925	16	495	18	440	16	100.0%	495	3	3,975	12.62	39.25	
SE	4,600	21	219	9	511	9	42.9%	511	1	900	8.41	26.05	
SU	2,300	32	72	6	383	6	18.8%	383	2	675	10.15	7.08	
CR	2,425	19	128	7	346	6	31.6%	404			11.66	10.95	
PW	37,602	95	396	95	396	65	68.4%	578	19	9,834	13.71	28.87	
IS	44,828	116	386	95	472	74	63.8%	606	20	12,798	15.66	24.68	
OP	91,706	242	379	235	390	167	69.0%	549	45	35,990	14.41	26.30	
PE	2,700	5	340	2	1,350	2	40.0%	1,350	4	6,936	17.19	31.41	
PE2	33,036	87	380	38	869	35	40.2%	944	3	6,100	18.13	20.94	
PE3	42,605	89	479	49	869	45	50.6%	947			18.14	26.39	
TOTALS	282,746	751	376	570	496	438	58.3%	646	100	82,033	\$15.03	25.05	
TYPE OF AWARDS													
SUSTAINED PERF.	148,751												
SPECIAL ACT	94,850												
PMAR	26,707												
CREDO	0												
BENE SUG	12,438												
TOTAL	\$282,746												

- Departmental Comparisons

All award money was lumped together in these calculations, because it was impossible to differentiate between various types. The award types are: Individual Performance Awards System (IPAS), Professional Merit and Recognition (PMAR) System, Credo Awards, and Beneficial Suggestion System. The IPAS is the major award type, with over 85% of the total incentive dollars being distributed through it.

It was found that money to be distributed for awards is not allocated to particular groups based on their payroll, even though NAWCADTRN's total awards money is based on 1% of payroll. The wide variation in bonus hours between groups is evidence of this situation. This is not a problem if the employees understand exactly how the incentive money is allocated to the different groups for distribution. If certain groups receive much greater than 1% of their payroll for awards, there should be a stated justification that these groups were deserving of this higher award level. Employees have a right to know how much award money is available for distribution.

Below are some of the groups tending towards either extreme with the awards allocation:

- Management received more bonus hours than non-management, mostly because the GMs were so high.
- Non-management was low, mostly because the GS technical bonus hours were low.
- The bonus hours allocated to departments were consistent with the above two observations. Staff was high (has more GMs & GS non-technical) and the engineering departments (PE2 & PE3) were low (most all GS technical).

Groups who tended to give a large payout to a small percentage of the employees will probably favor performance-based and pay-based (equitable) rewards based on the theories discussed in Chapter 2. The groups that fell into this category were: GS

technical, Management, PE2, PE3, IS, and Staff. Groups who tended to give small payouts to a large percentage of the group, will most likely favor equal shares for all. The groups that fell into this category were: Wage, GS non-technical, CP, PW, and OP.

Almost all of the information gained in this analysis was useful in preparing for the implementation of a gainsharing system at NAWCADTRN. A lot of changes in the incentive system (e.g., more openness, revised distribution methods, increased employee involvement, and more total awards money) must take place for gainsharing to be successful. A properly designed and implemented gainsharing system will be a step function increase over the present system, because it addresses and improves all four of these factors.

#### 4.3.3 Fiscal Profile

There were several potential funding sources depicted in the gainsharing model in Figure 2.4. It would be helpful to examine the NAWCADTRN funding base because any money used for gainsharing will have to come from the overall budget. At the highest level, NAWCADTRN funding can be categorized into either direct or indirect funding. Any work performed by NAWCADTRN that can be performed by other organizations, will have good benchmarking potential.

##### 4.3.3.1 Direct Funding

This type of funding is provided by sponsors to be used by NAWCADTRN Program Managers in direct support of a particular program. This supports work in: technology development, acquisition management, and fleet support. Half of the direct funding is for work that can only be performed by NAWCADTRN. This workload breakout was determined by going through the funding profile of all direct programs for FY92 and FY93. The other half of direct funds were to support programs that appeared possible to be performed by outside contractors. There seemed to be three major groups of direct



programs that could easily be performed by another organization.

- Engine/Component Testing: All planning, executing, and data analysis associated with testing. Other companies/government facilities are capable of performing this work and will have cost standards to use as a benchmark.
- Analysis Work: Function normally performed in support of other programs, where data is analyzed and recommendations are provided. Many consulting firms conduct this type of work and could be used for comparison.
- Technical Support: Engineering assistance provided to a program to define engineering solutions to complex problems. There are also industry standards for this type of work.

#### 4.3.3.2 Indirect Funding

Indirect funding was investigated in the same manner as the direct programs. Again, some of the indirect work can be performed by contractors and some cannot. This split is also about half. There are two major categories of indirect work, described below, that could be easily performed by another organization.

- Services: A repetitive task, like garbage collection, that could be contracted out. Cost of contracting out could be use as the standard to compare with.
- Functions: Necessary operations to continue running the Center, like plant modernization and regular maintenance.

It appears that half the work performed at NAWCADTRN is of a competitive nature and could be fairly easily compared to work done in other organizations and used as a benchmark for performance. Data could also be gathered to benchmark the non-competitive work, such as management overhead and comptroller, but probably won't be as specific to NAWCAD operations.

## CHAPTER 5: ANALYSIS

This chapter will describe the analysis of the raw and low-value added data that was outlined in the previous chapter.

### 5.1 Survey Analysis

This section assesses the results from both the employee and management surveys by survey construct. It then uses the construct results to help specify the five design parameters of the general model for a government, RDT&E facility.

#### 5.1.1 Results by Survey Construct

The purpose of this section is to outline the beliefs that NAWCADTRN employees have pertaining to the survey constructs explained in Chapter 3. The construct and question means, along with respondents' comments were used to perform this assessment. The scale is from 1 to 5, with 5 being "strongly agree." It is difficult to precisely combine subjective comments with numerical means, so an attempt was made to weight the comments based on the frequency in which similar themes surfaced.

All the statements made in this section will be inferences based on the data from the survey tallies. For instance if the following statement is made, "The present performance appraisal system at NAWCADTRN is unfair." This would indicate that generally the survey results show employees feel the Center's performance appraisal system is unfair. Since the survey was of a self-report nature, this analysis reflects only the employees' perceptions of the actual situation. For instance, employees may perceive that the present award system favors managers, when in reality employees receive a disproportionate share of the awards given. Perception is as important to understand as the reality when designing an improvement intervention. Because if employees perceive that things are bad, they probably are, even though the data indicates otherwise.

This section will compare and contrast the result of management and employee groups. The management sample consisted of the 24 member TQM Council made up of department heads and selected staff, which represents top-management opinions. The employee sample is a twenty-percent cross-section, representing all NAWCADTRN employees from division heads and below. It was important to survey management because they set policy and determine NAWCADTRN's strategic direction and will ultimately decide on any changes to the incentive and reward structure. When comparing the management results with the employees, statements such as "management is more intrinsically motivated than the employees" might appear. The logic behind this statement is simply that the management sample had a significantly higher numerical mean than the employee sample for the intrinsic motivation construct. The accuracy of this claim depends on the validity of the questions within each construct and how honestly the questions were answered.

There were many other analyses that could be performed on the survey data that were not performed as part of the original research methodology. An explanation of these techniques and the results of the supplemental survey analysis is described in Appendix J for selected constructs.

There are two paragraphs within each of the following constructs. The first paragraph examines the numerical means and general comments for the employee survey results. The second paragraph compares management results with the employees' to define any major differences. Numerical scores are inserted throughout this analysis. Several of these scores were a combination of more than 1 question but were not the complete construct, so they wouldn't be found on the tally sheets shown in Tables 4.1 and 4.2.

#### 5.1.1.1 Intrinsic Motivation

NAWCADTRN employees believe they are motivated by intangible rewards. They feel a sense of reward when they do quality work, on time, and to the best of their abilities.

NAWCADTRN employees see their fellow workers as being intrinsically motivated also, but to a lesser extent than they are. There is fairly solid agreement in this area. About 20% of the respondents were practically insulted at the suggestion that incentives could change the way they perform. These workers took pride in their work and wouldn't perform any different for any amount of money. There is a slightly greater sense of accomplishment when people complete a task that they determined needed to be done, as opposed to one that was assigned. For the most part, NAWCADTRN employees enjoy their jobs. People are slightly influenced by formal recognition or non-monetary awards for good performance (scored 2.82 out of 5).

Management is more intrinsically motivated than the employees. They also have a more positive view of their fellow employees' motivational level. There is solid agreement in this area. Management gets a high level of self-satisfaction when they complete a job and they enjoy their work very much. Recognition and non-monetary awards are fair motivators to improve performance (scored 2.77). They also feel that others are motivated to perform well. They believe NAWCADTRN employees are committed to work hard and do a quality job.

#### 5.1.1.2 Extrinsic Motivation

NAWCADTRN employees are also motivated by extrinsic rewards, but to a lesser extent than intrinsic motivators. More pay, better benefits, and improved monetary incentives would inspire workers to improve (scored 3.35). Many of the 20% that said they were insulted by the thought of incentives having an influence on their performance stated that a bonus would be nice, though. There is a very wide range of opinions on the impact of extrinsic rewards. But, monetary bonuses, benefits, and pay have a definite effect on the employees. The survey indicated that improved benefits would increase commitment (scored 3.76). A better bonus system would have a slight influence (scored 2.95), although NAWCADTRN employees' motivation to come to work is definitely not their pay check. It is interesting that employees feel their fellow workers are slightly more

influenced by their paycheck than themselves. Employees believe their fellow workers' intentions are, in most cases, to do a good job.

Management is much less extrinsically motivated than employees and believe their fellow workers have a low level of extrinsic motivation. They have a much more positive view regarding how much of an influencing factor the paycheck is; the paycheck is not a major determinant of employee performance in the manager's opinion. Improved benefits would slightly increase management's commitment to the Center (scored 2.71). The increased possibility of receiving a monetary bonus would have a small impact on the motivation of NAWCADTRN managers (scored 2.73). Management does not perform based on the amount of their paycheck and feel fellow workers have the same attitude.

#### 5.1.1.3 Individual Focus

NAWCADTRN employees feel they are not selfish in the work place. They are not solely concerned with their own job and their well-being. They feel others are a bit more individually focused than themselves. Employees don't lean towards either extreme with regards to being rewarded based on their work group's performance, but are slightly against equal rewards for everyone. They feel the group meetings they attend are beneficial and will ask for assistance from fellow workers and understand their fellow workers' skillbase.

Management is slightly more individually-oriented than the average employee. They also view fellow employees as being a little less selfish than the employees perceived. Management may feel a little uncomfortable being rewarded based solely on the performance of their fellow worker. Managers will not hesitate to ask for assistance from fellow workers and they know the skills these workers possess. They believe employees would be against equal rewards.

#### 5.1.1.4 Group Focus

NAWCADTRN has a fairly high team orientation (scored 3.50). Employees like working with the people at NAWCADTRN and feel they benefit from their contacts with coworkers. Most people enjoy group problem-solving and believe they can be effective when working in a team. NAWCADTRN employees feel their coworkers have a high team orientation like themselves. Employees receive improvement feedback from fellow workers and they really enjoy working with their fellow workers and try to get them involved in improving the Center. They feel the communications are less than adequate (scored 2.68). Employees feel their coworkers understand how they are contributing to the organization's mission and will definitely cooperate to get the job done. They lean slightly against being rewarded based on the Center's performance, though (scored 2.81).

Management is group oriented, even more so than the employees (scored 3.90). They benefit from working as a team and they work well as team players. They believe their coworkers are also group-oriented. There is a very solid agreement with regards to this area. Managers feel they get a fair amount of constructive feedback from coworkers and enjoy working with them. Management feels the communications at NAWCADTRN are mediocre (scored 3.09), and need improvement. They lean slightly towards having performance bonuses based on organizational performance (scored 3.14), which is the opposite of what the employees indicated.

#### 5.1.1.5 Performance Opportunities

NAWCADTRN employees believe they have a reasonable amount of opportunities to perform well and for the results of their performance to be visible (scored 2.95). This area possibly needs to be improved. Employees seem to indicate the need to be challenged more, so they can better prove their abilities and perform for the organization. They feel their coworkers have slightly less challenging performance opportunities to take advantage of than they have. Employees feel the amount of fulfilling work tasks and the opportunity to make an impact need to be increased in frequency (scored 2.58). They feel the opportunities presently available are fairly visible inside and outside of their

work group. Employees believe they aren't free to choose their work assignments, which indicates that employees want more say as to what they work on. NAWCADTRN's goals are communicated to the employees, but there needs to be some improvement (scored 2.99).

Management believes they have a great deal of opportunity to exhibit high performance, a considerable amount more than the employees felt they had. They also believe fellow workers have more opportunity to perform and have these results be visible than the employees expressed. Management has a very strong agreement in support of this attitude. Management has many opportunities to choose fulfilling work tasks, that are of high visibility and will reflect positively on them. They strongly feel they can have a long-term impact on the Center. They feel that their coworkers have a good opportunity to advance themselves. Management believes organizational goals are communicated to employees to a greater extent than did the employees.

#### 5.1.1.6 Behaviors Exhibited

Employees feel they take advantage of the performance opportunities that are available and, in most cases, try to create new opportunities for themselves. They believe their fellow employees are slightly less motivated to take advantage of the opportunities that are available. There is a very solid agreement with this viewpoint. Employees occasionally feel they are doing just enough to get by, but for the most part they try to seek challenging assignments to improve themselves and feel they sometimes take on "extra" work just to better the Center. The perception is that fellow employees complete the work they should (scored 3.53) and they will sometimes put forth extra effort to do an outstanding job (scored 3.39).

Management feels they frequently take advantage of their opportunities to perform well, even to a greater extent than the employees. They are also more positive about how readily their fellow employees will take advantage of opportunities. There is very solid

agreement with this perception. Management works to the best of their ability almost all of the time. They take on collateral duties for the benefit of NAWCADTRN and for the most part attempt to challenge themselves in their work. They believe the people at NAWCADTRN complete most of the work that they should be doing, and put forth extra effort to do the job right.

#### 5.1.1.7 Performance Measures

The opinion of NAWCADTRN employees is that the measures used to assess how well they are performing are fairly accurate and valid. There needs to be some improvement in the visibility of these measures (scored 3.40). A large contingent of people had no idea how their performance was measured, indicating a lack of visibility. Surprisingly, employees feel the performance measurement (informal and formal) of their coworkers is slightly less accurate than their own. Formal measures usually stem from set policies or procedures and informal measures usually happen spontaneously, like constructive criticism by a fellow worker. Employees believe they are being judged in the appropriate areas. The work they are given has reasonable deadlines and supervisors know how their employees are performing. The measures used to judge performance are somewhat clear to employees (scored 3.29). The frequency (scored 3.33) and quality (scored 3.77) of feedback most employees are receiving from coworkers and supervisors could be increased. Employees basically know what is expected of them, but they don't receive feedback in most cases on how well the Center is performing and work groups aren't receiving all the feedback they need. Interestingly, informal feedback is usually fairly accurate and helpful.

Managers have approximately the same views on their performance measurement as the employees indicated. They feel their feedback and measures may be a little more accurate than those for all employees. Managers are appraised in the appropriate areas and their major accomplishments are fairly well recognized by others. They feel more performance feedback is needed. Their deadlines are fair in most cases and believe



employees realize the expectations of their jobs fairly well (scored 3.44), but employees need to get better and more feedback on NAWCADTRN's performance (scored 2.77). Management is adequately informed on how their work groups are performing and the informal feedback that they receive from coworkers is usually very helpful.

#### 5.1.1.8 Performance Assessment

Employees believe that established performance measures are utilized in a fair and objective manner (scored 3.30). The survey comments seemed to indicate negative perceptions could be corrected simply with better communication and more openness in the performance appraisal and incentive award process. Interestingly, they believe the performance assessment of other's may be less fair than their's. There is fairly solid agreement on this view. There were several people who praised NAWCADTRN, and put total faith in the organization. Performance assessment is viewed as fair. Fellow workers realize when a coworker does good work, for the most part. Usually the informal feedback that people receive from their fellow workers is unbiased and accurate. The supervisors are giving employees some constructive feedback (scored 2.97), but probably needs to increase.

Management views their performance assessment as slightly more fair and objective than did the employees. They also feel performance appraisal is more accurate than the employees expressed. There is very strong agreement on this point. Management's performance assessment is viewed as fair, and managers are very aware when a coworker performs well.

#### 5.1.1.9 Recognition and Rewards

NAWCADTRN employee' perception is that their compensation is less than that of other organizations (scored 2.67). Most of the inequities are with: base pay, benefits, and career paths. Thus, recognition and rewards must be very effective in order to improve

the employees' negative perception of their overall compensation. Unfortunately, the employees feel recognition and rewards are not all that effective (scored 2.85). Employees feel they are not fairly compensated based on their work contribution and their level of responsibility (scored 2.57). They feel the recognition (scored 2.90) and rewards (scored 2.70) they receive for their efforts are inadequate and in need of improvement. There is a lot of inequity when compared to outside organization's compensation systems (scored 2.18). Employees seem to lack confidence that they will be promoted if they perform well. The survey results indicated a desire for more recognition of good performance. Informal recognition (i.e., pat on the back) exists, but probably needs to be increased. Indications were that the promotion and placement system needs to be based more on performance. The bottom line is that employees believe they are not sufficiently compensated and recognized for their work contribution.

Managers look more positively towards their compensation than the non-managers, but they still view it as less than adequate (scored 2.93). They feel their fellow workers are compensated at a slightly more equitable level than themselves (scored 3.15). Management has a wide range of views relative to their rewards and recognition. It was pointed out that the few military personnel on staff have different compensation policies than the civilians and may feel some inequities as a result. Managers believe they are not fairly compensated for their work contribution (scored 2.80), but their compensation is somewhat fair compared to others with a similar responsibility level at NAWCADTRN (scored 3.29). Bonuses that managers may receive help increase the perception of pay equity for their work contribution. They are recognized for their good work, which also helps to improve their poor opinion of their compensation. Managers also aren't sure that they will be promoted if they perform well (scored 2.86). They feel others don't receive fair compensation for their contributions to NAWCADTRN. Management believes their fellow workers receive formal and informal recognition for their everyday good work. The existing formal reward system is perceived as adequate (3.14), but may need improvement.

#### 5.1.1.10 Employee Involvement

Employees feel they are given a good chance to contribute in decisions that affect them. They believe their supervisors will listen to them and that they have the ability to change their work area and the way their job is done. They feel their fellow employees are given slightly less chance to be involved in decision-making than they are. The involvement system at NAWCADTRN needs to be improved and better defined, so that the employees know exactly how their voice can effectively be heard. Some of the comments stated that there are too many teams running around trying to solve the wrong problems and more team training is needed to promote more effective employee involvement. Supervisors listen to their employees and work with employees to involve them in decisions that directly affect them. Employees are skeptical that decisions are being made at the appropriate levels (scored 2.87). This may be more of a problem in the visibility of decision-making as opposed to the actual level that decisions are being made, though. Employees opinion is that management does consider their input to a certain degree (scored 3.03).

Management feels they have an excellent opportunity to be involved in the decisions that affect them. They believe employees have some opportunities, but to a lesser extent than themselves. There is a very strong agreement on this point. Management feels they have a great deal of influence in their work and the way it is done. NAWCADTRN management believes they are receptive to suggestions from employees and feel decisions are made at appropriate levels (scored 3.36), but improvements may be needed.

#### 5.1.1.11 Performance Improvement

Employees believe there is a culture that emphasizes performance improvement at NAWCADTRN. Employees are provided with the opportunities to improve themselves and their performance. People appear to have a lack of focus on the big-picture, though. They need a more Center-wide, global focus to truly practice Total Quality Management

principles. Employees tend to get too parochial and bogged down in the bureaucracy; then walk away frustrated from any attempts at improvement. There were a lot of comments reflecting this sentiment. Supervisors are helpful in improving workers' performance. Workers agree they are given the chance to develop their skills and they feel that innovation is stressed to a certain extent (scored 3.06).

Management feels they have a fairly good opportunity to develop their professional skills. They are slightly more positive about the performance improvement atmosphere, present at the Center, than were the employees. There is a good deal of agreement by management on this issue. Fellow managers help each other to improve. They have the opportunities to develop their skills and are provided with the chance for individual growth and development.

#### 5.1.1.12 Present Award System

The employees' opinion is that the Individual Performance Awards System (IPAS) is mediocre (scored 2.94) and may or may not have an impact on how they perform. A fairly large contingent conveyed the opinion that a lot of favoritism existed in award distributions. In contrast, about the same level of outcry perceived awards were distributed on a rotational basis (not performance based). Some of the sentiments echoed that awards were given to the "next person on the list" or to make up for people that didn't get promotions. Several complained about the lack of openness in the system; they didn't know who got awards and why, which breeds distrust. People don't fully understand how the IPAS distribution decisions are made. Several comments expressed a need for the system to be more objective and performance based. Many people wanted to see more of a link between pay and performance. Some wanted incentives to operate more like private companies, such as profit-sharing. Employees also had some doubts as to the benefit of the Quality Suggestion Program (QSP).

Management has approximately the same views on the IPAS as the employees expressed

(scored 3.16). There was a strong agreement that the existing system needed a lot of improvement. The IPAS is viewed as somewhat fair by managers. They understand the evaluation criteria for the IPAS, but the potential to receive one of these awards does not influence the managers work habits much at all. They view the QSP as marginally effective (scored 3.14).

#### 5.1.1.13 Reward Types

A majority of the NAWCADTRN Cross-Section (61%) stated that they would favor an equal distribution of gainsharing awards. Many that favored equal sharing of rewards, stated there also must be equal responsibility sharing for gainsharing to be an incentive. This is encouraging because gainsharing encourages teamwork to increase productivity. Equal shares are the best way to promote teamwork.

In contrast, management is slightly against equal reward distribution (only 38% were for equal rewards). They feel there may be too many people that don't contribute their fair share because they know they will get an equal share, regardless of their performance.

It is important to know the dollar amounts that people will value and that will have an impact on employees' attitudes and work habits. Gainsharing distributions that are too small will not have any impact. Based on a weighted mean, the average employee would be motivated by a year-end bonus of about \$925 and management would be motivated by \$1165. Approximately 20% of those responding to my survey indicated that no amount would make them change the way they do their job, though many of these people did state that a bonus would nice to receive. A yearly gainsharing bonus of \$1000, or a quarterly bonus of about \$250 would be a salient (valued) amount to the average NAWCADTRN employee. Since the average salary at NAWCADTRN is about \$35,000 (total payroll divided by number of people), this would translate to approximately a 3% bonus, which is comparable to industry. The IPAS total pot for FY91 was approximately \$250K and \$240K for FY92. This translates to an equal share of about \$333 per person

each year. Presently, the IPAS total funding is only 1% of the total labor budget. Based on these figures, it appears the incentive budget must be tripled for it to be an effective and meaningful motivational force for the employees.

### 5.1.2 Survey Results and Design Parameters

There were many issues that emerged from my survey analysis in the previous section that directly relate to the five design parameters outlined in the general gainsharing model. This section will describe the information supporting each design parameter and how the model will be specified for NAWCADTRN. Many issues regarding NAWCADTRN's readiness for gainsharing emerged from the survey results, which are discussed in the fifth parameter, Integration.

#### 5.1.2.1 Funding Source

Most of the information to specify this parameter will be derived through interviews. However two of the survey constructs, "Present Incentive System" and "Reward Types," had some relevance to this parameter. The present performance award systems are not having an impact on the employees. There are a lot of negative perceptions revolving around the Individual Performance Award System (IPAS); employees believe it needs to be more open and performance based. The Quality Suggestion Program (QSP) is viewed as not being very effective. In addition to incentives, there needs to be an improvement in base pay, benefits, and career paths. Employees also perceive large compensation inequities compared to outside organizations. This is out of the organization's control for the most part, but needs to be factored into any incentive intervention.

The money from existing incentives could easily be diverted for use by the gainsharing system without much complaint from the employees. Any payouts from this money supply are not actually "earned" by the employees, because the money is already allocated as part of the budget, regardless of how the organization performs.

Distribution of this money would have to be subject to some type of a validity check by exceeding target performance levels in one or several predefined areas. This will help ensure that payouts are deserved. This contribution will provide a initial working fund, but will need to be supplemented by other means in the future. In NAWCADTRN's case, this amount would be about a third of a salient level of funds required. The pot would need to be about \$1000 per person or three percent of payroll.

#### 5.1.2.2 Distribution

The employees seemed to welcome the idea of having some of their incentives based on the Center's and their work group's performance. They leaned towards having equal organizational and work group shares. There was also a large constituency, especially managers, that desired some type of individual component for fear of having the employees lose their individual identity and drive to excel. The high level of extrinsic motivation for many employees would also indicate that an individual component is a necessity. Therefore to appease both groups, there should be equal organizational shares. Work group shares should be distributed equally to group members, and may be an individual share to certain high performers. The size of these shares will be determined by the performance measurement design parameter.

There was also a strong indication that incorporating a recognition component into the distribution parameter would enhance employee satisfaction with the gainsharing system. This component would operate primarily at the group and individual levels. although an organizational level recognition, through some type of ceremony/party, would be welcomed by the employees. Recognition will, in most cases, appeal to both intrinsically and extrinsically motivated employees. Informal feedback, which is actually part of the performance measurement parameter, should also be advocated as a form of recognition. This is very inspiring from an intrinsic motivation standpoint.

#### 5.1.2.3 Performance Measurement

The formal performance assessment/appraisal at NAWCADTRN is viewed as fair by employees. The only relation between this process and the gainsharing system will be that employees receiving unsatisfactory ratings will not receive any gainsharing payouts. Establishing measures and rewarding based on these will cater to employees' extrinsic motivation, but the system should not be too rigid as to suppress intrinsic behavior. It is felt that placing more focus on organizational level measures will foster more intrinsic behavior and leaning more towards individual measures will encourage extrinsic behavior. So to appeal to all employee preferences, a balanced three level measurement system that drives three distribution levels needs to be established, although the individual component would be part of the recognition and reward system. Measures should be a mix between quantitative and qualitative to create more balance.

Informal feedback, like a pat on the back for doing a good job, is greatly appreciated and is highly motivating. An organizational culture rich with informal feedback will be intrinsically motivating to NAWCADTRN employees. This trait will only be established through training and perpetuated through continual awareness, which will be accomplished through the employee involvement design parameter. The visibility of high performing individuals and work groups needs to increase to set role models for other's behavior and to reinforce this high performance. A more structured performance measurement system incorporating a visibility room will reveal and promote improved performance at all three organizational levels. A visibility room will also eliminate misperception and mistrust among employees.

#### 5.1.2.4 Employee Involvement

NAWCADTRN employees are team players and cooperate to "get the job done." They enjoy working with their coworkers and help to improve each other's performance. Employees want to improve, but they feel NAWCADTRN's culture is apathetic at times and the bureaucracy stifles their efforts. People want to contribute to the organization and are willing to work to improve the Center. They believe there are channels available



for them to be involved, but they tend to be restricted. A more effective and visible EI system will help to improve this area by facilitating more team work and group problem-solving. The formation of employee teams to improve the organization is the driving force behind the success of gainsharing. The existing QSP was not viewed as very effective by employees, but should not be disbanded to provide those employees that may be hesitant to establish/join teams a mechanism to provide their input.

In addition to the teams whose purpose is to improve NAWCADTRN, there is also employee involvement, which directly supports gainsharing, that is absolutely essential. Employees will help to design and implement the gainsharing system. They will also be responsible for its operation. This includes the teaming to improve the organization (explained in the previous paragraph), and administering the system. Employees will also help develop their work plan, which part of the performance appraisal system. Communication is a key aspect of employee involvement. Employees presently view communication as mediocre and want to be kept more informed.

#### 5.1.2.5 Integration

One of the first parts of gainsharing integration is to assess the level of organizational readiness. Several overall issues stemming from the survey results emerged that relate to employee readiness. The response rate was much higher than expected, over 75% for the Employee Survey and over 90% for the Management Survey. This fact alone is encouraging. It shows that NAWCADTRN employees have enough concern to provide their input on a potential effort to improve organization. Employees indicated a commitment to doing a good job. Employees feel they are completing the work they should and, in most cases, they take advantage of performance opportunities. But at times, employees feel their motivation level could increase.

Improved: pay, benefits, and incentives (as mentioned in the first design parameter) would increase employee commitment and thus, help to improve the Center's long-term

performance. A serious effort to improve the incentive system should be undertaken, since incentives are the only one of these concerns under NAWCADTRN management control. Gainsharing can help in this matter. Looking at the entire "Reward Process" (described in Chapter 3), employees feel most improvement is needed in the available performance opportunities and recognition and rewards. Management also agrees that recognition and rewards should be improved. The present incentive system needs to be vastly improved to instill an atmosphere of high performance. Employees will be better motivated to improve if they know that they will be recognized/ rewarded for short-and long-term performance improvements. The opportunity to perform needs to increase. Employees want input into selecting the work tasks that they are best suited for and that are fulfilling. Management is much more optimistic than employees on the quantity and quality of available performance opportunities for employees.

Employees appear to be in support of a gainsharing system, but an employee vote should be conducted to increase awareness and employee buy-in. It appears that the employee involvement system should be established first to unify the culture and set the stage for gainsharing. The performance measurement system should be established next, because it is the most complex and most controversial. Then an organization-wide, small scale bonus should then be established as an attention getter. The bonus and PM parameters could then be expanded to a full-scale system, when the organization is deemed ready.

## 5.2 Interview Analysis

The interview results, shown in Table 4.4, were used to validate the general model and further specify the model for a government, RDT&E facility. Although the gainsharing organization representatives and the gainsharing experts were interviewed mainly to provide validation information, some of the results were incorporated into the specific model. The same was true for the interviews with NAWCADTRN management and NAWCADTRN sponsors. This section explains how the interviews validate the general model and specify a NAWCADTRN model.

### 5.2.1 Model Validation

Validation information gathered through interviews, is broken out by each of the five gainsharing design parameters as shown below.

#### 5.2.1.1 Funding Source

Overall, all four funding sources are viewed as viable for a gainsharing system. There were some differences in opinion as to the importance that should be placed on each. Most did feel that self-funded systems are the easiest to sell to management and are the most common. Self funding systems use measures that directly tie into dollar impacts on the organization, such as profitability, cost savings, or productivity for example. Bottom line impact tends to concern management most. This pot could be supplemented by other organizational priorities, like material savings or reduced rejection rates. Using a high level, but balanced, set of funding sources helps to avoid sub-optimization, where employees begin to concentrate all their efforts towards only what is measured.

Savings has its disadvantages because they tend to be short term and, specifically labor savings, which are becoming a smaller part of manufacturing companies' budgets. Taking money directly out of the operating budget could avoid these problems, but measures will have to be very accurate and management must have confidence in their importance. Almost all organizations have incentive money set aside. This money could possibly be used to supplement the gainsharing pot, but it is not recommended to deplete the existing incentive pot too much. Gainsharing is only one component of an organization's overall incentive strategy and there must be funding available for these other incentive systems, like providing special act awards. Companies need to allocate at least 3-5% of their labor budgets for all incentives for them to be salient, how much of this is allocated to gainsharing depends on company philosophy.

#### 5.2.1.2 Distribution

The overwhelming feeling on distribution was that gainsharing is an organizational intervention, so distributions should be made organization-wide, based on its performance. Group level distributions are a definite option, especially if groups are geographically dispersed or they are autonomous. Individual level distributions are greatly discouraged because they run counter to the gainsharing philosophy of teamwork. Other incentive systems will cover some of the group focus and all of the individual recognition. The distribution can be made either equitably, based on each employee's income, or in equal shares. The employee-organization share ratio will be determined by the average size of the gainsharing pot. If the funding source and measures normally cause a large pot to accrue, where employees would get extremely large bonuses, the organization will receive most of the pot for investments in improvements. If the pot is small, employees should get most of the pot so they receive an amount that is motivating. Also, if gainsharing is replacing some of the employees' base pay, gainsharing payouts should be large. The cycle of distribution will be defined by the business cycles of the organization, so that bonus shares are not wildly erratic. It is suggested to give the gainsharing bonus by means of a check separate from the paycheck.

#### 5.2.1.3 Performance Measures

As discussed with funding source, the highest level measures to drive a gainsharing system should be directly tied to cost. Any non-self funding measures that are used should somehow indirectly tie to a dollar impact on the organization. For example, try to assess the bottom line impact on measures like customer satisfaction increasing by 10% or product quality going down by 5% and associate a dollar amount to these. Both the employees and management must have a high level of confidence in the accuracy and importance of non-self funding measures for them to be used. Only objective measures should be used at first, then phase in qualitative measures to the extent that is appropriate and that the organization is willing to accept. It is highly recommended to use self-funding measures and, based on organizational priorities or strategic initiatives for that period, index the gainsharing payout with non-self funding measures like: quality,

customer satisfaction, or safety. You want to ensure that the concerns of all key stakeholders are represented, like those of management, employees, and customers. Use of non-financial measures helps to provide for a more balanced set of measures, thus broadening the employees' perception of organizational performance. Measures should also account for the impact of external forces on organizational performance, so that factors outside the organization are being incorporated.

One could also make the system goal-oriented, where the organization sets goals in certain performance areas and changes them periodically. A system could have one goal and if met, a predetermined GS bonus will be distributed. A goal-oriented system could also have a series of goals, where some or all have to be met and the amount distributed could vary based on how much the goals are exceeded by. Goals can even be set at the working group or project level to increase group identity. Groups working on higher visibility projects tend to be viewed as performing at a higher level, even though this is not the case. Any group level measurement system should account for this phenomenon.

#### 5.2.1.4 Employee Involvement

The sentiment was very clear that a strong EI system was required for gainsharing to be successful. Many felt that gainsharing is a component of an organization's participative management strategy or that gainsharing is employee involvement with a bonus attached. EI must have both horizontal and vertical communication channels and an established QMB structure to facilitate this. Employees must have the channels available to get the information required to determine areas to improve and there must be a structure in place to form teams to attack areas identified as needing improvement. The measures must channel improvement information from customers/management to the proper location. It was noted that the EI structure should be quite formalized in the beginning and then may transition to a more informal process with less oversight as the process matures.

Employees should be actively involved in the development and implementation of the

system. This can occur either at a minimal level such as through employee votes or surveys or at a more involved level where employee representatives work closely with management to design the system. Consultants could play a role in this process to varying degrees; they also help alleviate the problem of designers having a vested interest in gainsharing. Employees should play a part in managing the system and suggesting possible improvements. There should be no employee involvement in determining which groups or people receive gainsharing payouts because of the controversy that might arise with this type of subjectivity.

#### 5.2.1.5 Integration

All basically agreed that integration is the most important and complex issue and is taken too lightly in most cases. This occurs not only with organizational interventions involving gainsharing, but with any intervention. There are many variables dictating integration effectiveness, which a design team has no control over, such as: politics, personalities, and market forces. The gainsharing system will be integrated as a component of an organization's overall incentive and involvement strategy and must be specified to the organization's context. A boiler plate system that does not complement the organization's overall compensation elements will normally fail.

Employee involvement must commence first and be ingrained into the corporate culture, then performance measurement can be phased in. The bonus will be activated last. Before the bonus starts, the organization could run a simulation of the gainsharing system to estimate bonus distributions and determine if they are affordable and will be sustainable. Training for all employees will need to occur during all three of these phases: to educate, raise awareness, and solicit support. Management will receive more extensive training on the gainsharing system. Part of the integration process will be to identify similar organizations with gainsharing systems to gather their lessons learned and use these systems to benchmark against. In addition to benchmarking, the system could be evaluated by: interviews, surveys, and perhaps focus groups involving the employees.

## 5.2.2 Model Specification

The information collected from the interviews is broken out by each of the five model parameters. These descriptions are focused towards the specific characteristics required for a gainsharing system in an organization similar to NAWCADTRN.

### 5.2.2.1 Funding Source

Government budgets are shrinking, especially in the RDT&E sector, which makes funding a gainsharing system for an organization like NAWCADTRN quite complicated. There are many more regulations and much more public scrutiny on the use of public dollars for this purpose than would be with a non-government organization. There were mixed feelings on the applicability of all four funding sources to NAWCADTRN, but most felt that all four funding sources were viable. Some felt that savings due to process improvements should be used, because this source is self-funded. These people recognized potential drawbacks of using savings, which were: inflated budgets, sponsors decreasing budgets due to excessive savings, and the short-term life of savings as a funding source for gainsharing. Savings are applicable to the test and evaluation side of the house, but there was strong sentiment against applying savings to R&D projects because this type of work is so dynamic and there are no standards. Target savings could only be applied to very large test programs. These types of projects are normally several years in length and would probably have to be broken up into shorter segments for gainsharing.

Most of the interviewees felt that 1% of the labor budget for all incentives was way too small and should be increased to around 4%. Gainsharing should only be a portion of this pot, perhaps 2% of the labor budget. The existing incentive pot could be used to supplement gainsharing. The existing pot may constitute a large portion of the gainsharing payout in the beginning, then tail off as the system becomes more ingrained. Surprisingly, there was a strong sentiment in favor of a usage fee that could be applied

to programs to fund gainsharing payouts, as long as money could be returned to sponsor's when performance is low. This requires complete buy-in to this plan, from all customers.

#### 5.2.2.2 Distribution

With regards to the levels of distribution, all felt gainsharing was an organizational level performance incentive plan and payouts should be made equitably to all employees. Past incentive distribution patterns at NAWCADTRN were not systematic, as seen in Table 4.5. Some thought equal shares were more appropriate, which could remedy a lot of mistrust revolving around past incentives. Quite a few felt that high performing groups should receive additional payouts, although much smaller than the organizational share. Any money to be distributed organization-wide, will most likely be made as a special act award, given to all by the commanding officer. Groups awards can be signed-off for by the supervisor. Both of these awards should be issued by separate check and definitely not as part of the paycheck. Basically all felt that there should be no individual component in gainsharing.

Most felt that group performance should be recognized mostly outside of gainsharing, through other incentives and that individual performance should be recognized entirely outside of gainsharing. No left over money at the end of year may be used for gainsharing, this must be returned to the sponsor. The share ratio between employees and the organization should be around 50-50.

#### 5.2.2.3 Performance Measurement

The business environment for the government is changing dramatically. More work will be contracted out in the future and less will be done in-house. This means there will be less "actual" work to measure and less competition to compare to, so measures will be come even more unspecified in the future. It is important to have visible and accurate



performance measures, so people have faith in the gainsharing system. These measures should be tied directly to payouts at the organizational level. It is very difficult to measure the contribution of each group because of the synergism that exists in the RDT&E environment. The measurement system should be extremely quantitative towards the beginning of the system, then qualitative measures can be phased in. Qualitative measures should be used in conjunction with quantitative, self-funding measures to index payouts. Meaning payouts may be raised or lowered as defined by measures such as customer satisfaction and quality measures.

Some measures that could be used in a government, RDT&E facility are: facility utilization, asset use, test hours, and productivity ratio. Some qualitative measures could be: customer surveys, management surveys, meeting of program objectives, performance objectives for department, and achievement of vision/mission statements. Appendix I lists many process measures that could be used for this purpose.

#### 5.2.2.4 Employee Involvement

The interviewees felt strongly that employees must be actively involved in the development of a gainsharing system at NAWCADTRN. The union should work closely with management, with special consideration given to the blue collar employees. A representative development team will survey employees for their gainsharing preferences, then management or the executive board will provide their input. This input will be consolidated into a final design. Consultants should be employed heavily towards the beginning of development, and during implementation to facilitate an efficient process. Employees will be trained by these consultants to eventually manage the gainsharing system autonomously.

The employees must also be very involved with the operations of the system. A board to manage the system will be established, headed by a representative from the TQM office. This board should distribute employee surveys on a yearly basis to gather

feedback on the gainsharing system in order to improve it. They should also survey management and customers. The board will present and review their assessment of the gainsharing system. In order for improvement to take place, a quality management board structure should be established, which mirrors the organizational structure. These boards will organize improvement initiatives and appoint performance action teams to develop and implement improvement strategies. The employees may also establish a peer review process for individual and group performance feedback. This process will have no effect on payouts though; payouts will be totally measurement driven.

#### 5.2.2.5 Integration

Results from the interviews for the specific model were very similar to the general model. Integration is very complex, especially for government, RDT&E organizations. Gainsharing must be integrated with the overall compensation/incentive and employee involvement philosophies at NAWCADTRN. Employee involvement for improvement must be established first, then EI for gainsharing phased in. Awareness through meetings and employee vote will occur early to establish an initial buy-in. It may be an effective and conservative approach to begin the gainsharing system small, perhaps in a division or function. You may also initially use a scaled-down version of the full-scale gainsharing design, using a smaller number of measures, which fuel smaller payouts. The designers should also be the implementors. Throughout development, involve people with organizational knowledge such as legal and comptroller and those with employee understanding, such as shop stewards. The TQM office will be in charge of the system and will lead a formal board to monitor and manage the system.

The design group should select a baseline gainsharing model from similar organizations to use as a starting point and a comparison tool. A government repair depot is probably a good candidate, along with a private-sector R&D organization, such as an aerospace or pharmaceutical firm.

## CHAPTER 6: CONCLUSIONS

This chapter discusses validity issues and proposes a revised version of the general gainsharing model. Issues related to a government, RDT&E gainsharing model are discussed, along with changes to the original research methodology, followed by a listing of recommendations.

### 6.1 General Model Validation

The validity of the research process is discussed in this section, along with the validity of the gainsharing models that were produced.

#### 6.1.1 Process to Develop Models

Section 3.5 explained a plan to ensure that validity was ensured throughout this research effort, which was followed very closely. Many gainsharing cases, gainsharing principles, and behavioral theories were investigated to provide a knowledge-base so that the skills to develop an initial general model could be acquired, then devise a method to improve upon this model. Having this knowledge-base enabled this researcher to perform as an effective interviewer and surveyor during data collection and to analyze these results to provide accurate and meaningful results.

Several representatives from the Naval Air Warfare Center Aircraft Division, Trenton (NAWCADTRN) were contacted to help fully understand the characteristics of a research, development, test & evaluation (RDT&E) facility run by the government and how these characteristics may support or hinder gainsharing. Through a rigorous interview and survey process the general model was validated and improved and the issues specifically related to gainsharing in a government, RDT&E facility were defined.

Many validity issues were examined in Section 3.5.1. The issues that have been

addressed after proposal submittal are discussed below.

1) Criterion validity. To examine this, the results of the management surveys were compared with the results of the management interviews for similar themes. There were several areas that both instruments were trying to measure and the results were consistent in all of these cases. No contradiction existed for any construct when comparing the interviews with the surveys. Both information sources conveyed that employee involvement is critical and should be promoted to the fullest extent and that more decision making should be driven down to the employees. The survey and interviews both indicated that performance feedback is important to provide on a consistent basis. The results of the surveys and interviews showed a group/team orientation and showed mixed feelings towards equal rewards. The employee survey examined similar areas when compared with other surveys distributed to similar organizations. The results were consistent between surveys, as described in section 4.1.5. The consistency of results in these areas shows criterion validity for the measures used in this research method.

2) Content validity. This issue was fully addressed in Chapter 3.

3) Construct validity. The interview constructs were an investigation of the model design parameters. The interview group deemed these to be a good set of questions (constructs) to investigate the issues related to model validation. They also felt the five model design parameters to be very logical and reasonable. The survey constructs supported each of the five design parameters as discussed in section 5.1.2.

4) External validity. Both the survey and interview samples were a good representation of their population group. The gainsharing representative and gainsharing expert samples could have been larger to provide a better

representation, but logistical problems prevent increasing the size of these samples.

5) Internal validity. The interview results were taped and transcribed word for word. The results were then summarized by design parameter for either the general model or the specific model, careful steps were taken. I was conscious not to let bias enter into any of the interview analysis steps. The survey results were quantitative, in terms of means and standard deviations, except for the respondents comments, where the prevailing themes of these comments were integrated with the numerical scores.

5) Reliability. There was minimal to no measurement error in the surveys because of the quality control during distribution and analysis. These results will be entirely repeatable, except if employee attitudes change because of time or environmental variables. The interviews were also conducted in a very objective manner with a list of predetermined questions being asked and all results being taped and transcribed. These results should be repeatable also.

### 6.1.2 Improved General Model

Overall, the feedback from the interviews was favorable and the sentiment was that they were impressed with the representativeness of the model. There were no major conceptual changes to the original model, only a consolidation and re-prioritization of the issues. The following section describes modifications to Figure 2.4 that will improve the model's simplicity, usefulness, and accuracy. Figure 6.1 depicts this new model. The order of the design parameters have changed to reflect the revised importance and chronology.

#### 6.1.2.1 Employee Involvement

# IMPROVED GENERAL GAINSHARING MODEL

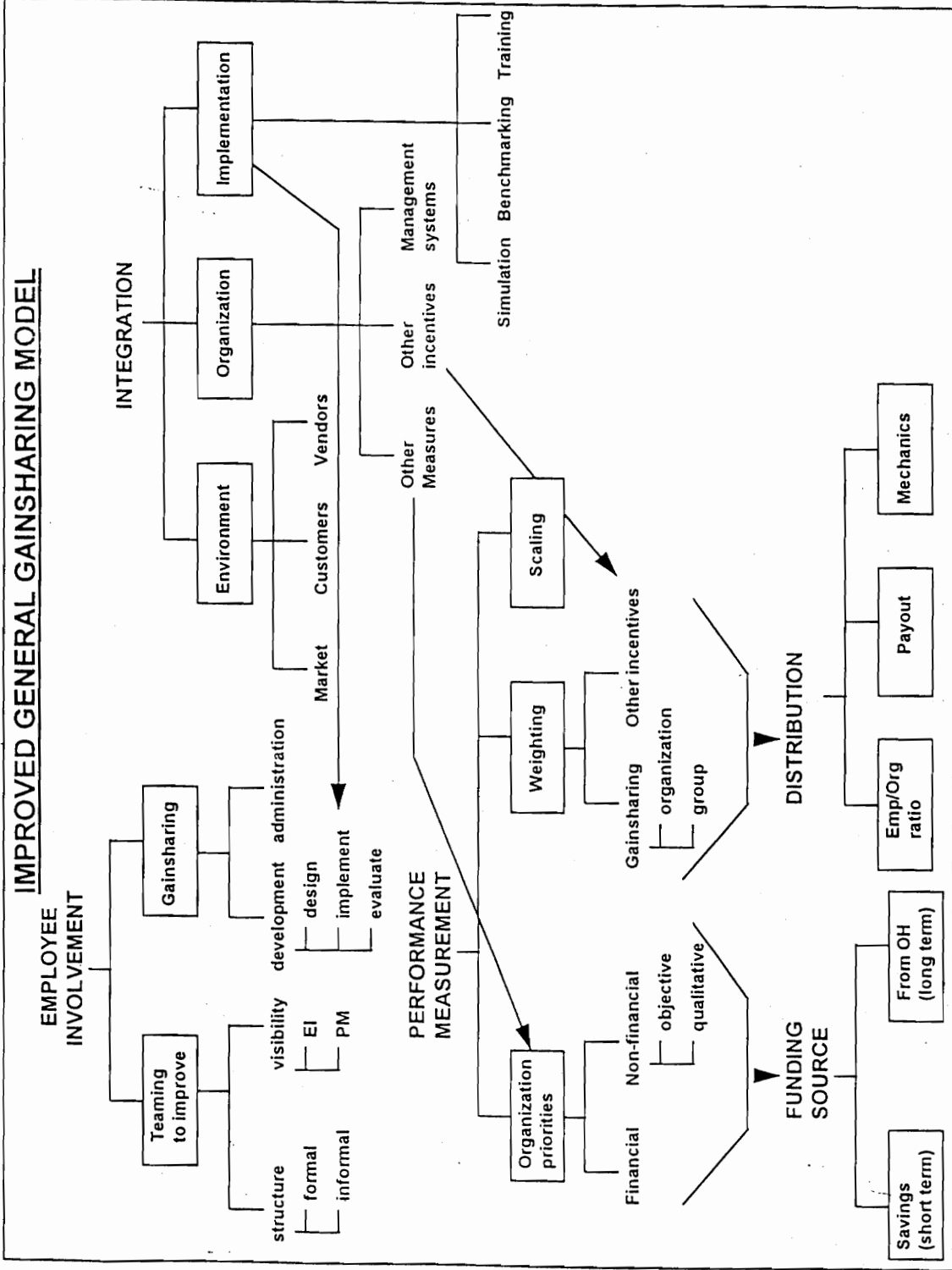


Figure 6.1. Improved General Gainsharing Model

The strongest opinion voiced in the entire interviewing process was that a strong Employee Involvement system with deep roots in the organization must be established, before gainsharing should be attempted. The mechanisms for effective horizontal communication and rapid mobilization for improvement efforts must already be in place. Gainsharing should be viewed more as a component or an outcome of the organization's participative management philosophy, than a separate entity. Employees must therefore be very active in the design and development of the gainsharing system, where they will be guided by management and assisted by consultants in this area. An employee board should be set up to develop and monitor all five of the design parameters.

#### 6.1.2.2 Performance Measurement

Performance measurement is the other major issue that an organization must have a firm grasp on before attempting gainsharing. Organizational priorities must be examined and measures established to monitor these. These measures will either monitor financial or non-financial priorities. They should be broad in nature to avoid sub-optimizing the performance focus of the organization. To support gainsharing, it is recommended to have a dependable set of financial measures, acceptable to both management and employees, to be able to justify payouts based on improvements in cost-related areas. Non-financial measures should be highly objective at first to remove any ambiguities in the early stages of gainsharing. These measures could then become more subjective as the system matures and could be weighed more heavily, but tied to a bottom-line impact in some manner.

The organization must grow and foster the measurement system to match changing organizational priorities. The emphasis that the organization wishes to place on organizational versus group/team performance must be determined to define the payouts at the two levels. There will be many performance measures supporting other incentive systems, which may be incorporated into GS. The scaling of the measures will be dictated by the results of current measures and the level of payouts desired. These issues

will be addressed and coordinated by the integration team. Those measures supporting the gainsharing system must be made clear to the employees, so that employees are not confused by a meager gainsharing payout when they perceive high performance levels based on non-gainsharing measures.

#### 6.1.2.3 Integration

The design and implementation of the gainsharing system is the next critical issue. The overwhelming opinion of most of those interviewed was that integration of the gainsharing system into an organization's infrastructure is an extremely complex issue. Gainsharing must consider the organizational context and cannot be designed as an autonomous system. The business environment must be carefully considered during design. The gainsharing objectives must support the overall incentive and compensation philosophies of the organization. Probably about 5% of labor costs should be set aside for incentives, depending on the organization's incentive principles, and a large portion of this pot devoted to gainsharing. All management systems impacting gainsharing must be identified early and these interfaces fully addressed and administrative mechanisms developed. For instance, gainsharing must complement other incentive systems and be properly aligned with existing measurement systems. It is recommended to run a simulation of the system prior to actual implementation to define payout amounts. Training of both employees and management is also critical during the implementation phase for both educational and awareness reasons.

#### 6.1.2.4 Funding Source

This is the design parameter that ended up being reduced substantially in criticality from the initial model. Initially, it was felt that defining the funding source was the most important and difficult issue to contend with, but the sources of funds for gainsharing end up being a fall-out of the measures selected in the performance measurement parameter. The amount of payout desired will also dictate the source and the level of GS funds. The



interviewees felt all four funding sources explained in Figure 2.4 to be viable, but they should be combined into two sources, which are either savings or from overhead. Savings are easy to sell as a measure and a funding source because they are self-funding, provide self-justification, and are easier to track. They are short term sources though. Taking money from overhead can support payouts stemming from non-financial measures, like customer satisfaction and quality. Long-term self-funded measures like profitability are popular, even though these funds are normally acquired from overhead funds. Measures such as these should reflect real improvements because you don't want to distribute gainsharing payouts, when no improvements have been made.

#### 6.1.2.5 Distribution

The level of distribution is driven by the performance measures selected and the weighting that a company places on organizational versus group performance. The employee/organization ratio is based on an overall gainsharing philosophy, which is to provide the employees with more money to take home, based on measured improvements. Gainsharing also provides money for reinvestment in the organization. Major stakeholders like sponsors or stockholders will usually want a say in dictating this ratio. The bonuses distributed to employees can be equal or equitable based on pay. The mechanics of the system involve determining the distribution cycle and whether to distribute the bonus in a check separate from the paycheck.

## 6.2 Specification Issues

Many issues surfaced during the interview and survey processes that are specific to a government, RDT&E organization such as NAWCADTRN.

### 6.2.1 Employee Involvement

Most employees at NAWCADTRN are team players and should be given the opportunity

to work on gainsharing teams. They want to be kept informed and involved in making improvements to the organization. Communication lines must open up to facilitate a more effective employee involvement system. A Quality Management Board structure with Performance Action Teams appears to be the best option for NAWCADTRN. The results of these EI team activities must be made apparent to the organization by incorporating it into a performance measurement visibility system. The Quality Suggestion Program should remain to enable the employees that are not comfortable with being on a team to make a contribution. All employees will have to be trained on the involvement structure and the importance of teamwork and providing your coworkers with performance feedback.

The employees will develop and administer the gainsharing system in conjunction with management and the union. Management will provide bounds for the gainsharing design and the employees will develop the details of the system and then will be aided by consultants to implement the system. An employee board will manage the operation of the gainsharing system and make improvements when identified through periodic assessments.

### 6.2.2 Performance Measurement

Measures will be established based on NAWCADTRN priorities. Initially, cost savings will most likely be the only measure. This is a short-term measure, which provides a good start for the initial stages of the gainsharing system. Once this measure is established, the gainsharing system can commence. Other measures, both financial and non-financial can then be phased in. The financial measures will be indexed to high-level non-financial measures (i.e, customer satisfaction) to drive payouts.

The weighting of gainsharing when compared to other incentives will probably be fairly heavy. The gainsharing performance measures should be heavily weighted towards the organization, with a small group component. Individual performance measurement will

be covered by other incentive/measurement systems outside of gainsharing. Employees with an unsatisfactory performance rating should receive no payouts. They will need to develop an individual improvement plan and meet the plan objectives to gainshare in the next period.

A visibility system showing organizational performance with regards to the organizational measures must be established. This will help to foster more openness and awareness of the organization's performance and help to focus employee energy in the important areas and those in need of improvement.

### 6.2.3 Integration

The readiness level of NAWCADTRN for gainsharing based on the survey results was very high. The employees want an improved incentive system and are leaning strongly towards gainsharing. As discussed in section 6.1, the employee involvement system for improvement should be established first and then performance measures established. The employees should then develop the gainsharing system and set the performance measures based on gainsharing priorities. Awareness of the system, through meetings, newsletters, or a vote, must be emphasized throughout gainsharing integration. The system should start on a small-scale then grow to meet organizational requirements.

This design parameter is even more critical in the government, RDT&E environment than in a private-sector organization because of the many regulations and the strong influence of the current political climate. During gainsharing design, the environment, political climate, and pertinent regulations must be thoroughly evaluated. An efficient way to develop a gainsharing system is to identify similar organizations operating successful gainsharing systems as a baseline to compare with and to possibly use as a strawman for the design of the gainsharing system. After the system is fully developed, it is a good idea to conduct a simulation of the system to assess predicted payouts.

At a very high level, improved: base pay, benefits, and career paths must occur for gainsharing to be successful at NAWCADTRN. The employees must also be provided with more opportunity to perform for the organization, as indicated in the survey. The gainsharing system must be integrated with the other incentive systems that are presently in operation. The existing Individual Performance Award System should be cancelled because the employees view this system as ineffective and unfair, but the QSP system should remain. To compensate for this, a reward and recognition system should be established to reward individual achievement, which is a major concern of management. This system will complement the gainsharing system and reinforce intrinsic motivation, but must be much more open than previous incentive systems. Gainsharing can be used as a tool to address compensation inequities with outside organizations.

#### 6.2.4 Funding Source

It is very possible to use some of the funding from existing incentives to provide a starting pot for gainsharing. This pot will need to be augmented by at least a magnitude of three to be salient for employees. The existing incentives can be used at first, then tail-off their contribution to the gainsharing pot. Savings are a good funding source to phase in, but savings are a short-term source. For major T&E projects, savings should be broken out into short segments. All other work at NAWCADTRN will not be able to supply a large amount of savings. Most of the additional funding for gainsharing will have to come directly from overhead. This will be supplied by means of either slighter higher overhead rates, or a usage fee on each program.

#### 6.2.5 Distribution

The distribution of organizational gainsharing bonuses should be in equitable shares, based on employee pay. The group shares should be distributed equally to all in that group. Recognition should be integrated as much as possible with the gainsharing distribution to create more openness and visibility of performance. The formal process

for organizational distribution is that the Commanding Officer will grant a special act award to all employees receiving a bonus. Group awards can be authorized by the immediate supervisor of that group. Based on the government, RDT&E environment the employee-organization share of gainsharing funds should be around 50-50.

### 6.3 Modifications to Method

There were several activities that were added to the research methodology. The largest addition was the supplemental survey analysis, which is discussed in Appendix J. This analysis was both educational and helped validate some of the survey constructs from the gainsharing survey developed and used in this thesis effort. Several other similar surveys were located and analyzed in addition to the QOP survey, as portrayed in section 4.1.5. These surveys lend additional validity to the gainsharing survey.

There was a considerable amount more information collected during the informal interviews than was originally envisioned. The information regarding NAWCADTRN's incentive, measurement, and employee involvement systems was extremely beneficial in assessing gainsharing feasibility. Another major additional task was that a supplemental literature review was performed and integrated into Chapter 2. This helped provide knowledge in areas that were identified to be important.

One of the major assumptions in developing the survey was that the people interviewed would provide information to either validate the general gainsharing model or to define specific government, RDT&E issues. However, there were several instances where the interviewees provided valuable information to support the other. Also, the intention to develop a specific model was changed to a definition of specific issues, as a result of organizational changes at NAWACDTRN and their impending closure. This was felt to provide more utility to other government, RDT&E organizations. It also took considerable more time to complete the effort than originally planned.

## 6.4 Recommendations

Based on the findings of this research effort, there are additional research efforts and some actions that should be undertaken to further develop this thesis and made use of its results.

### 6.4.1 Additional Research

Future research needs to pursue and develop an instrument to define organizational readiness for gainsharing in a government, RDT&E environment. Most readiness instruments are focused towards the production environment. The employee survey that was distributed in this thesis effort could be distributed to similar organizations to compare results and improve upon it and possibly be used in this capacity. An instrument to help gather more detailed design information from the employees would also be of great value, in addition to readiness information. More should be published on small sample selection for interviewing of different population groups. The integration of the vast array of qualitative information, such as that collected during these interviews, to formulate a final assessment should also be researched further.

Much more research needs to be undertaken in the area of customized gainsharing systems and how these systems are integrated into the existing incentive/compensation scheme and management systems. A gainsharing designer needs to be aware of how specific traits of gainsharing are supplemented by these other systems and which traits are in conflict. A menu of how gainsharing supports or opposes present incentive practices would be helpful to a gainsharing designer. A comprehensive list of methods to create identity and line-of-sight with the organization and work group through incentives/gainsharing and employee involvement needs to be developed.

The issue of non self-funding vs. self-funding measures seemed to be a major design issue that should be further investigated. The estimated man-hour savings from

improvement initiatives tend to be simply paper savings and some gainsharing systems are driven solely by this type of measure. It would be interesting to see how these estimates relate to bottom line impacts to get a feeling for their accuracy and usefulness. Utility and material savings tend to be real and have bottom line impact. Guidelines could be developed to define what constitutes "real" man-hour savings. Also, the issue of employee contribution to productivity surfaced several times. An empirical formula based on historical data would help to possibly define productivity improvements due to capital investments as opposed to employee productivity changes.

#### 6.4.2 Action Required

The results of this effort should be published in the Defense Technical Information Center (DTIC) catalogue of publications. This catalogue is made available to all government, RDT&E activities. It will enable the results to be accessible to the prime audience for this thesis effort, enabling these organizations to be more aware of the tremendous potential gainsharing has in their organization. The findings of this thesis indicated that the focus on gainsharing should remain strong in the government, RDT&E sector, although it is a very complex environment to pursue such an incentive intervention.

NAWCADTRN should actively pursue gainsharing and become a vanguard for the implementation of innovative gainsharing concepts in a government, RDT&E facility even though the facility is scheduled to close in (3) years. This situation provides an atmosphere that is willing to accept more risk. Even if the GS system doesn't meet expectations, no real harm will be done. The representativeness of the NAWCADTRN workforce and the type of work performed by the organization make them a prime candidate to demonstrate a proto-type gainsharing system. This demonstration will provide extremely valuable data for similar organizations attempting gainsharing. NAWCADTRN should continue their point system for recognition because the employees indicated a preference for it and the system showed some success; it also complements

gainsharing. Any awards or bonuses other than the organizational gainsharing bonus should be published, so that openness is encouraged and bias can be tracked. This was a problem with the previous incentive systems, as indicated in the survey results. A final action is to develop a simulation software capable of calculating payout levels based on a history of organizational performance measures selected.

#### 6.4.3 Final Comments

This research methodology was solid, where the research questions developed initially, guided the entire research effort to validate and specify a gainsharing model. The final product of this thesis was extremely pleasing and a lot of gainsharing knowledge was gained through: literature review, examination of case studies, and initial interviews. The survey and interview processes helped this author to become proficient at instrument development, execution, and analysis. The magnitude of data that must be funneled down to a small amount of precious information is now understood. Though in some cases information was not directly applicable, it was quite informative.

It is very helpful in the development of gainsharing system to examine several other systems and possibly build a strawman for your system based on these. But gainsharing systems cannot be boiler plate, they must be tailored to the organization's specific environment, culture, and management processes. Any gainsharing system must possess elements of effective incentive systems, such as: clear goal articulation, accurate measurement, equity, timeliness, performance contingent rewards, and variable pay. Employee involvement is also a major component to integrate. Incentives are becoming an increasing component of compensation and gainsharing has shown the potential to be a significant portion of a company's incentive system. It is felt that gainsharing will increase in its application in traditional applications (i.e., production), but it also increase substantially in service-type organizations. Due to its unique characteristics and tailorability, we will see more gainsharing systems in the government, RDT&E environment.



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## **APPENDICES**



## Appendix A

### Demographics of Survey Sample

Twenty percent of Naval Air Warfare Center Air Warfare Center, Trenton employees were randomly selected to receive my survey. Eight categories were examined to see how close to twenty percent each category of my sample was. The results were very favorable. The percentage of people selected from each population group is shown followed by the total number of people in that population group for NAWCADTRN. The breakout by departments is shown also. There were 756 NAWCADTRN employees when the distribution list was developed.

#### 1. Race

White	Black	Asian	Hispanic	Am. Ind.
17.2	29.0	70.0	21.0	0.0
622	93	20	19	2

#### 2. Classification

GS	GM	WG/WL/WN/WD	WS
22.2	21.6	17.4	11.5
428	37	264	26

#### 3. Age

Under 50	50 +
18.8	20.5
575	181

#### 4. Position type

Prof	Admin	Tech	Cler
21.0	15.2	29.2	31.9
271	46	72	47

Other	Blue Collar
10.1	16.9
30	290

#### 5. Gender

Male	Female
22.6	19.6
623	133

6. Experience

Under 5yr	Over 5yr
19.2	21.6
282	474

7. Grade level

Appr	1-4	5-7	8-12	12+
16.7	19.0	25.5	18.6	23.9
6	42	102	517	88

8. Department/Division

Staff

00	07	09
66.7	18.2	20.0
3	11	15

Civilian Personnel

CP1	CP2	CP3	CP4
33.3	0.0	33.3	0.0
3	4	3	1

Security

SE1	SE2	SE3
10.5	0.0	100.0
19	1	1

Supply

SU1	SU2
21.4	31.3
14	16

Comptroller

CR1	CR2	CR3
25.0	33.3	0.0
8	3	4

Public Works

PW1	PW2	PW3	PW4	PW5
0.0	50.0	23.1	37.5	13.3
1	4	13	8	60

Information Systems

IS1	IS2	IS3	IS4	IS5
0.0	18.9	21.7	0.0	15.8
1	37	46	0	38

Operations and Plant Engineering

OP1	OP2	OP3
0.0	15.3	22.3
2	131	103

Propulsion Engineering 2

PE21	PE22	PE23	PE24
28.6	20.0	20.8	22.7
14	25	24	22

Propulsion Engineering 3

PE31	PE32	PE33	PE34	PE
19.0	11.1	30.8	23.8	60.0
21	27	26	21	5

NAWCADTRN TOTALS

Percent Sampled	20.1
Total Employees	756

## Appendix B

### Survey Question Development by Construct

The following is a list of questions that were generated to gather information supporting the constructs explained in Chapter 3. The constructs are grouped into three categories: Employee Attitudes, Perceived Reward System, and NAWCADTRN Characteristics. Within each construct, questions are focused towards the individual respondent's perceptions of themselves and questions are focused towards the respondent's view their work group/NAWCADTRN. Most questions I developed, but some are from a gainsharing survey developed by the Naval Personnel Research and Development Center (NPRDC). These questions are indicated below with an asterisk.

The questions listed below make up the Employee Survey. The final draft of the actual survey to be distributed along with the cover letter is shown in Appendix C. I slightly modified the employee survey, so it would be appropriate for management. To arrive at the final draft for both surveys, the odd numbered questions taken from this list of questions were placed in order, 1-34. The even numbers were translated to be 35-68. The two questions for the Saliency of Reward Types construct are listed as (69) and (70) in this listing, and remain (69) and (70) on the final survey forms. This was done to break up similar questions for the final survey.

#### Employee Attitudes

##### 1) Intrinsic vs extrinsic motivation.

#### Intrinsic-Individual:

- 1) When I complete a task assigned by my supervisor or sponsor, I feel a sense of accomplishment.
- 2) When I complete a task that I determined needed to be done, I feel a sense of accomplishment.
- 3) My job is enjoyable.
- 4) I tend to perform my job better when there is a possibility of receiving an award (non-monetary) or some type of recognition.

#### Intrinsic-Group/NAWCADTRN:

- 5) NAWCADTRN employees believe they should work hard and do a good job.

\$10,000

note: The previous 2 questions fall under the category of Employee Attitudes. I placed them last in the survey because they are yes-no questions.

Perceived Reward System

4) Performance opportunities available.

Individual:

23) I have the opportunity to choose assignments that are fulfilling to work on.

24) I am given the opportunity to have a positive impact outside my work group.

25) I am given job opportunities that will make me look good, if I execute them well.

Group/NAWCADTRN:

26) Organizational goals are clearly communicated to the employees.\*

27) People in this organization are free to take independent actions that will improve their job standing at NAWCADTRN.\*

5) Behaviors exhibited.

Individual:

28) I regularly take on responsibilities that fall outside my position description to benefit NAWCADTRN.

29) I rarely find myself doing just enough to get by.

30) I actively seek challenging assignments to further develop my skills.

Group/NAWCADTRN:

31) The people at NAWCADTRN complete the work they should.\*

32) NAWCADTRN employees tend to go the "extra mile" to do a quality job.

6) Validity of performance measures/feedback.

Individual:

33) My performance appraisal is based on the areas in which I should be appraised.

34) My supervisor knows how well I perform.\*

35) My boss compliments me on the appropriate/important jobs I have done well.\*

36) I receive ample feedback to let me know how well I am performing.\*

37) My deadlines for completing assignments are realistic.\*

38) The measures used to judge employee performance are clear to me.\*

Group/NAWCADTRN:

39) Employees are clear about the end results expected of them on their job.\*

40) My work group receives ample feedback to tell us how we are performing.\*

41) NAWCADTRN employees receive adequate and correct feedback on how well the organization is performing.\*

42) When my fellow employees give me feedback on how to improve, it is normally helpful.

7) Fairness of performance assessment.

Individual:

43) Based on the areas/criteria used to assess my performance, my supervisor "grades" me fairly.

44) My fellow employees are aware when I do good work.

Group/NAWCADTRN:

45) People at NAWCADTRN hear about both successes and mistakes that they have made.\*

46) NAWCADTRN supervisors frequently give constructive feedback to improve job performance.\*

8) Recognition and reward.

Individual:

47) I am fairly compensated (pay check) for my work contribution to NAWCADTRN.

48) I am sufficiently recognized for my good work.

49) My pay is fair compared to others with similar responsibilities at NAWCADTRN.\*

50) My pay is fair when compared with people having similar responsibilities in other organizations (government and industry).\*

51) The money (salary and bonuses) I receive for doing my job reflects how well I perform at NAWCADTRN.\*

52) I am confident that I can receive promotions as a result of my performance at NAWCADTRN.\*

Group/NAWCADTRN:

53) NAWCADTRN employees are fairly and adequately compensated (pay) based on their work contribution.

54) NAWCADTRN employees get informal recognition (i.e., pat on back, handshake) when they do good work.

55) My work group is recognized for it's everyday accomplishments.

56) NAWCADTRN has a good formal reward system (money and recognition) to reward employees for doing excellent work.

#### NAWCADTRN Characteristics

##### 9) Employee involvement.

Individual:

57) I can influence changes in the way my work is done.\*

58) My supervisor is willing to accept any suggestions I have for improving work processes.\*

Group/NAWCADTRN:

59) I feel decisions at NAWCADTRN are made at the appropriate level.

60) Suggestions for improvement are seriously considered by management.

10) Performance improvement.

Individual:

61) My supervisor helps me to improve my performance.\*

62) I am given the chance to develop my professional skills.\*

Group/NAWCADTRN:

63) People are encouraged to be innovative in their jobs.\*

64) NAWCADTRN provides opportunities for individual growth and development.\*

11) Existing incentives.

Individual:

65) I believe the Individual Performance Awards System at NAWCADTRN is fair.

66) I understand the evaluation criteria my supervisor uses to determine Individual Performance Awards.

67) The possibility of receiving a bonus through the Individual Performance Award System provides some incentive for me to do a better job.

Group/NAWCADTRN:

68) The new Quality Suggestion Program (formerly the Beneficial Suggestion System) is a good mechanism to get people to make improvement suggestions.



## Appendix C

### Employee Survey

From: Robert M. Dunn, PE34

To: Selected Personnel

Subj: GAINSHARING SURVEY

1. You have been randomly selected to fill in the enclosed survey. One out of five NAWCADTRN personnel were selected to provide a representative cross-section of the Center. People were selected from all work areas, grade levels, experience, age, gender, race, position types, and classifications. The results of this survey will provide information to possibly help develop a gainsharing system for NAWCADTRN.
2. Examining the gainsharing potential at NAWCADTRN is an effort supporting KRA 1 (TQM) of our Strategic Business Plan. This survey is distributed through and supported by the TQM office (OOQ). Gainsharing is a system that allows employees to share in any "gains" made an organizations, which are normally measured by dollars saved. The savings are usually shared equally by distributing a monetary bonus to all who contributed.
3. Please read each question carefully and respond by circling the number based on the extent to which you agree with each statement. If you don't understand a question or you feel the question does not apply to you, leave it blank. After completing the survey, place it in the enclosed envelope and return the survey to Robert Dunn through the TQM office. Your input is extremely important because of the small percentage of people asked to fill this out. So, please take the time to respond. It should take about 20 minutes to complete. Your identity will remain anonymous. Results of the survey will be made available shortly. If you would like a copy of the results or have any questions please call me at X5747. Thank you for your input.

Bob

### NAWCADTRN Gainsharing Survey

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1) When I complete a task assigned by my supervisor or sponsor, I feel a sense of accomplishment.   | 1 | 2 | 3 | 4 | 5 |
| 2) My job is enjoyable.   | 1 | 2 | 3 | 4 | 5 |
| 3) NAWCADTRN employees believe they should work hard and do a good job.   | 1 | 2 | 3 | 4 | 5 |
| 4) Better benefits (i.e., hospitalization, leave) would make me feel more committed to NAWCADTRN.   | 1 | 2 | 3 | 4 | 5 |
| 5) The paycheck is practically the only motivating factor for NAWCADTRN employees to perform their jobs.  | 1 | 2 | 3 | 4 | 5 |
| 6) I'd be uncomfortable having most of my performance bonuses be based on my work group's performance. (Your work group consists of the people you work most directly with to accomplish your job). | 1 | 2 | 3 | 4 | 5 |
| 7) I usually don't get much out of meetings I attend with my work group.  | 1 | 2 | 3 | 4 | 5 |
| 8) NAWCADTRN employees wouldn't think it is fair to distribute performance bonuses in equal shares.   | 1 | 2 | 3 | 4 | 5 |
| 9) My coworkers give me constructive feedback/helpful advice to improve my job performance.   | 1 | 2 | 3 | 4 | 5 |
| 10) I believe performance bonuses should be based on the Center's performance.  | 1 | 2 | 3 | 4 | 5 |
| 11) We have good communications at NAWCADTRN.   | 1 | 2 | 3 | 4 | 5 |
| 12) I have the opportunity to choose assignments that are fulfilling to work on.  | 1 | 2 | 3 | 4 | 5 |
| 13) I am given job opportunities that will make me look good, if I execute them well.   | 1 | 2 | 3 | 4 | 5 |

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 14) People in this organization are free to take independent actions that will improve their job standing at NAWCADTRN.  | 1 | 2 | 3 | 4 | 5 |
| 15) I rarely find myself doing just enough to get by.  | 1 | 2 | 3 | 4 | 5 |
| 16) The people at NAWCADTRN complete the work they should.   | 1 | 2 | 3 | 4 | 5 |
| 17) My performance appraisal is based on the areas in which I should be appraised.                                       | 1 | 2 | 3 | 4 | 5 |
| 18) My boss compliments me on the appropriate/important jobs I have done well.   | 1 | 2 | 3 | 4 | 5 |
| 19) My deadlines for completing assignments are realistic.   | 1 | 2 | 3 | 4 | 5 |
| 20) Employees are clear about the end results expected of them on their job.   | 1 | 2 | 3 | 4 | 5 |
| 21) NAWCAD employees receive adequate and correct feedback on how well NAWCADTRN is performing.                          | 1 | 2 | 3 | 4 | 5 |
| 22) Based on the areas/criteria used to assess my performance, my supervisor "grades" me fairly.                         | 1 | 2 | 3 | 4 | 5 |
| 23) People at NAWCADTRN hear about both successes and mistakes that they have made.                                      | 1 | 2 | 3 | 4 | 5 |
| 24) I am fairly compensated (pay check) for my work contribution to NAWCADTRN.   | 1 | 2 | 3 | 4 | 5 |
| 25) My pay is fair compared to others with similar responsibilities at NAWCADTRN.  | 1 | 2 | 3 | 4 | 5 |
| 26) The money (paycheck and bonuses) I receive for doing my job is appropriate based on how well I perform at NAWCADTRN. | 1 | 2 | 3 | 4 | 5 |
| 27) NAWCADTRN employee's receive fair and adequate compensated (pay) based ont their work contribution.                  | 1 | 2 | 3 | 4 | 5 |

28) My work group is recognized for it's everyday accomplishments.	1	2	3	4	5
29) I can influence changes in the way my work is done.	1	2	3	4	5
30) I feel decisions at NAWCADTRN are made at the appropriate level.	1	2	3	4	5
31) My supervisor helps me to improve my performance.	1	2	3	4	5
32) People are encouraged to be innovative in their jobs.	1	2	3	4	5
33) I believe the Individual Performance Awards System at NAWCADTRN is fair.	1	2	3	4	5
34) The possibility of receiving a bonus through the Individual Performance Award System provides some incentive for me to do a better job.	1	2	3	4	5
35) When I complete a task that I determined needed to be done, I feel a sense of accomplishment.	1	2	3	4	5
36) I tend to perform my job better when there is a possibility of receiving an award (non-monetary) or some type of recognition.	1	2	3	4	5
37) I would perform my job better if there was an increased possibility of receiving a monetary bonus.	1	2	3	4	5
38) The only reason that I come to work everyday is for the paycheck I receive.	1	2	3	4	5
39) I am hesitant to ask for assistance from those around me to improve my job performance.	1	2	3	4	5
40) I am unsure exactly what job skills the people in my work area possess.	1	2	3	4	5
41) My coworkers are concerned only with themselves.	1	2	3	4	5
42) I enjoy working with the people at NAWCADTRN.	1	2	3	4	5

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 43) I try to get my fellow workers involved in improving the work place.                                 | 1 | 2 | 3 | 4 | 5 |
| 44) My work group understands how their work contributes to NAWCADTRN's mission.                         | 1 | 2 | 3 | 4 | 5 |
| 45) The people in my work group cooperate to get the job done.   | 1 | 2 | 3 | 4 | 5 |
| 46) I am given the opportunity to have a positive impact outside my work group.                          | 1 | 2 | 3 | 4 | 5 |
| 47) Organizational goals are clearly communicated to the employees.                                      | 1 | 2 | 3 | 4 | 5 |
| 48) I regularly take on responsibilities that fall outside my position description to benefit NAWCADTRN. | 1 | 2 | 3 | 4 | 5 |
| 49) I actively seek challenging assignments to further develop my skills.                                | 1 | 2 | 3 | 4 | 5 |
| 50) NAWCADTRN employees tend to go the "extra mile" to do a quality job.                                 | 1 | 2 | 3 | 4 | 5 |
| 51) My supervisor knows how well I perform.  | 1 | 2 | 3 | 4 | 5 |
| 52) I receive ample feedback to let me know how well I am performing.                                    | 1 | 2 | 3 | 4 | 5 |
| 53) The measures used to judge employee performance are clear to me.                                     | 1 | 2 | 3 | 4 | 5 |
| 54) My work group receives ample feedback to tell us how we are performing.                              | 1 | 2 | 3 | 4 | 5 |
| 55) When my fellow employees give me feedback on how to improve, it is normally helpful.                 | 1 | 2 | 3 | 4 | 5 |
| 56) My fellow employees are aware when I do good work.   | 1 | 2 | 3 | 4 | 5 |
| 57) NAWCADTRN supervisors frequently give constructive feedback to improve job performance.              | 1 | 2 | 3 | 4 | 5 |

- 58) I am sufficiently recognized for my good work. 1 2 3 4 5
- 59) My pay is fair when compared with people having similar responsibilities in other organizations (government and industry). 1 2 3 4 5
- 60) I am confident that I can receive promotions as a result of my performance at NAWCADTRN. 1 2 3 4 5
- 61) NAWCADTRN employees get informal recognition (i.e., handshake, pat on back) when they do good work. 1 2 3 4 5
- 62) NAWCADTRN has a good formal reward system (money and recognition) to reward employees for doing excellent work. 1 2 3 4 5
- 63) My supervisor is willing to accept any suggestions I have for improving work processes. 1 2 3 4 5
- 64) Suggestions for improvement are seriously considered by management. 1 2 3 4 5
- 65) I am given the chance to develop my professional skills. 1 2 3 4 5
- 66) NAWCADTRN provides opportunities for individual growth and development. 1 2 3 4 5
- 67) I understand the evaluation criteria my supervisor uses to determine Individual Performance Awards. 1 2 3 4 5
- 68) The new Quality Suggestion Program (formerly the Beneficial Suggestion System) is a good mechanism to get people to make improvement suggestions. 1 2 3 4 5
- 69) If there was a pot of money for gainsharing to distribute throughout the Center, would you want the bonus distribution in equal shares to everyone at NAWCADTRN? yes no

70) Would you change the way you do your job, to any extent, if there was a possibility of receiving end-of-year bonuses in the following amounts?

\$100	yes	no
\$500	yes	no
\$750	yes	no
\$1,000	yes	no
\$1,500	yes	no
\$2,500	yes	no
\$5,000	yes	no
\$10,000	yes	no

GENERAL COMMENTS:

## Appendix D

### Interview Materials

From: Robert M. Dunn

To: Interviewees

Subj: GAINSHARING MODEL

1. Per our previous discussion, I am enclosing a list of questions that will be asked when I interview you shortly. These questions are designed to enable me to either check the validity of my gainsharing model or to define a model specific to a government, R&D organization.

2. For your information a brief description of the general interview process is shown below:

- Prior to the interview, I will send a copy of the questions that I will be asking and a description of a general gainsharing model that I developed. This will let you (the interviewee) formulate initial thoughts pertaining to the issues I will be investigating.
- At the interview, I will tape the discussion, so there won't be a need for me to take comprehensive notes.
- After the interview, I will type up summarized transcripts of each interview. The results from all interviews will be placed in a checklist format to better portray the more frequent themes of the interviews. I will then develop a short interview analysis.

3. The interview questions are listed on the following pages. Please look over them. If you have any questions, please contact me at (609) 538-5747. I look forward to speaking with you at our scheduled interview. Thank you.

Bob



## Interview Questions for NAWCADTRN Management

Please read the attachment, which gives a brief explanation the general gainsharing model I have developed, based on my review of literature. The results of your interview will be used to specify the general model for a government, RDT&E facility. The questions are broken out by design parameter.

### 1) Funding Source:

- a) Are the four funding sources viable for an organization like NAWCADTRN?
- b) Of the viable sources, which options (bottom level boxes) will be most effective for NAWCADTRN?
  - savings:
  - existing incentives:
  - target savings into bidding:
  - from budget:

### 2) Distribution:

- a) Should there be a gainsharing distribution at all three organizational levels?
- b) Which options are most appropriate for NAWCADTRN?
  - philosophy:
  - levels:

### 3) Performance Measures:

- a) How should performance measures be tied to payouts?
- b) How should performance be measured at the three organizational levels?
- c) How objective should the measures be?

### 4) Employee Involvement:

- a) To what extent should employees be involved in gainsharing development?
  - design
  - implementation

b) How should employee involvement be structured for organizational improvement?

c) Should employees have input into payout amounts (deciding which groups or individuals performed best)?

d) Who should administer the system?

5) Integration:

a) How should the gainsharing system be activated?

b) In what sequence should the system be integrated into the organization?

c) How should the system be evaluated?

6) Other comments:

## Interview Questions for NAWCADTRN Sponsors

Please read the attachment, which gives a brief explanation the general gainsharing model I have developed, based on my review of literature. The results of your interview will be used to specify the general model for a government, RDT&E facility. The questions below pertain to the first two design parameters.

### 1) Funding Source:

- a) Are the four funding sources viable for an organization like NAWCADTRN?
- b) Of the viable sources, which options (bottom level boxes) will be most effective for NAWCADTRN?
  - savings:
  - existing incentives:
  - target savings into bidding:
  - from budget:

### 2) Distribution:

- a) Should there be a gainsharing distribution at all three organizational levels?
- b) Which options are most appropriate for NAWCADTRN?
  - philosophy:
  - levels:

### 3) Other comments:

## Interview Questions for Organizational Reps/Gainsharing Experts

Please read the attachment, which gives a brief explanation the general gainsharing model I developed, based on my review of literature. The results of your interview will be used to validate this general model.

1) Do the attributes and options that make up each of the following design parameters seem logical?

- funding source:
- distribution:
- performance measurement:
- employee involvement:
- integration:

2) Do the relations between design parameters seem reasonable?

a) Performance measures dictating how much will be distributed. Either by: adjusting savings, determining an amount to be taken from budget, or simply acting as a validity check.

b) The level of employee involvement present in gainsharing integration?  
This consists of: teams for activation of system, evaluation of the system, and involvement in payout decisions.

3) In general, does the model seem valid to you. Does it make sense?

4) Other comments:

## Appendix E

### Interview Checklists

PERSON				
QUESTIONS				
NAWCADTRN Mgmt and Sponsors				
1) Funding Source				
a) sources viable?				
b) most effective options?				
2) Distribution				
a) levels of distribution?				
b) most appropriate options?				
3) Performance Measurement				
a) measures tied to payouts?				
b) measurement at the 3 levels?				
c) objectivity of measures?				

PERSON				
QUESTIONS				
4) Employee Involvement <hr/> a) involvement in development?  b) involvement for improvement?  c) input into payouts?  d) involvement in administration?				
5) Integration <hr/> a) activation?  b) sequence?  c) evaluation?				

PERSON				
QUESTIONS				
Gainsharing Reps and Experts				
1) Logic of Attributes and Options				
a) funding source?				
b) distribution?				
c) performance measurement?				
d) employee involvement?				
e) integration?				
2) Relations Between Parameters				
a) performance measures and distribution?				
b) employee involvement and integration?				
3) Model makes sense/valid?				

## Appendix F

### Test Group Results

From: Robert M. Dunn  
To: Survey Test Group

Subj: SURVEY TEST GROUP RESULTS

1. Thank you very much for helping me by filling out my survey and giving me your input on how to improve it. I received back all five test group surveys and calculated the results. I then analyzed each person's responses to assess beliefs pertaining to certain areas. I call these areas "constructs." This exercise was very helpful to me because I found several flaws in my survey: distribution, collection, and analysis process. The survey and my analysis methods were improved as a result.

2. My next step is to validate my survey constructs. I will do this by telling you your scores for each construct and what I believe your scores signify. The questions were scored on a scale from 1 to 5, except the questions for the last construct. You will see that each construct has a score for Individual and Group perspectives. Individual means your attitudes on how the construct relates to you; group is defined as how you believe the construct relates to others at the Center. If you agree with my interpretation of your beliefs regarding a construct, this will help validate that questions are supporting the constructs. I will also show how your scores relate to the mean scores of the test group. If you have any follow-up questions call me at X5747.

Bob



## Test Group Validation

I met with each person who received the Test Survey. Each person indicated the questions that they felt were unclear and I subsequently made corrections to these questions. I then explained how I developed the survey. I outlined definitions for each of the survey constructs that I developed and based on their scores, described my impression of their beliefs relative to each construct.

Each person in the Test Group stated their level of agreement, from 1 to 5 (strongly disagree to strongly agree), with my assessment of their beliefs pertaining to that construct. After speaking with each person in the survey test group, I calculated the mean degree of agreement for each construct (both Individual and Group focus). The mean score for degree of agreement with each construct is shown below for my test survey group. A high scores (4 or above) lends validity to my survey. The next few pages show the test group's mean score from the survey and their mean score on level of agreement.

Test Group Scores and Interpretation Agreement

1) Intrinsic vs extrinsic motivation.

	Intrinsic		Extrinsic	
	Ind	Group	Ind	Group
survey mean	4.00	3.20	3.07	2.75
agreement mean	4.80	4.60	4.80	3.75

2) Group vs individual focus.

	Individual		Group	
	Ind	Group	Ind	Group
survey mean	2.22	2.80	3.40	3.20
agreement mean	4.40	4.20	4.00	4.60

3) Saliency of reward type.

Equal Reward Distribution

survey mean	60% say Yes
agreement mean	no interpretation needed

Impact of Reward Amounts (in dollars)

	100	500	1000	1500	2500	5000	10000
survey mean	.20	.40	.40	.60	.80	.80	.80
agreement mean	no interpretation needed						

4) Performance opportunities available.

	Ind	Group
survey mean	2.40	2.20
agreement mean	4.60	4.20

5) Behaviors exhibited.

	Ind	Group
survey mean	4.07	3.10
agreement mean	4.20	4.60

6) Validity of performance measures/feedback.

	Ind	Group
survey mean	3.00	2.70
agreement mean	4.20	4.20

7) Fairness of performance assessment.

	Ind	Group
survey mean	3.20	2.50
agreement mean	4.20	4.20

8) Recognition and reward.

	Ind	Group
survey mean	1.97	2.20
agreement mean	4.60	4.40

9) Employee involvement.

	Ind	Group
survey mean	3.30	2.80
agreement mean	4.40	4.60

10) Performance improvement.

	Ind	Group
survey mean	3.20	2.80
agreement mean	4.60	4.80

11) Existing incentives.

	Ind	Group
survey mean	2.53	3.00
agreement mean	4.80	4.25

Appendix G

Survey Validation Tables

NAVAIR TEAM SURVEY COMPARISON																	
GS SURVEY	QUES	SCORE	SD	QUES#	SCORE	SD	QUES#	SCORE	SD	QUES#	SCORE	SD	QUES#	SCORE	SD	%MEAN	DIFF
*	1	4.29	0.93														
*	2	4.40	0.93														
*	3	3.36	0.80	73	3.74	0.00										11%	
*	4	2.82	1.31	78	3.83	0.00										36%	
*	5	3.36	0.97	63	3.86	0.00										15%	
*	INTR	3.76	0.98														
*	6	2.95	1.30	76	3.84	0.00	82	3.92	0.00							32%	
*	7	3.76	1.34	81	3.46	0.00										8%	
*	8	2.76	1.30														
*	9	2.49	1.30														
*	EXTR	2.91	1.22														
*	10	3.50	1.29														
*	11	1.99	1.35														
*	12	2.78	0.99														
*	13	2.29	1.04														
*	14	2.46	1.19														
*	15	2.51	1.22	24*	2.88	0.00	27*	2.33	0.00							4%	
*	INDV	3.36	1.27														
*	16	2.56	1.18														
*	17	4.17	1.16														
*	18	3.47	1.26														
*	19	3.80	0.74														
*	20	2.81	0.96														
*	21	3.74	1.08														
*	22	2.68	1.00	1	3.06	0.00	6	3.45	0.00	16	3.05	0.00	25	2.94	0.00	17%	
*	GROU	3.88	1.04	24	3.12	0.00	27	3.67	0.00	65	3.48	0.00				12%	
*	23	3.50	1.21														
*	24	2.58	1.19	22	3.63	0.00	53	3.31	0.00							34%	
*	25	3.52	1.22														
*	26	3.02	1.15	22	3.63	0.00	0									20%	
*	27	3.99	1.25	1	3.06	0.00	6	3.45	0.00	25	2.94	0.00				5%	
*	PFOP	2.59	1.10														
*	28	2.89	1.18														
*	29	3.59	1.21														
*	30	3.77	1.05														
*	31	3.86	0.92														
*	32	3.53	1.00														
*	BVEX	3.39	1.00	23	3.36	0.00	45	3.76	0.00							5%	
*	33	3.63	1.04														
*	34	3.60	1.20														
*	35	3.77	1.38	71	3.55	0.00										1%	
*	36	3.50	0.99														
*	37	3.33	1.17	70	3.37	0.00										4%	
*	38	3.33	1.17	68	3.14	0.00	70	3.37	0.00							2%	
*	39	3.79	1.26	22	3.63	0.00										4%	
*	40	3.29	1.16														
*	41	3.40	1.03														
*	42	3.08	1.09	51	3.14	0.00	68	3.14	0.00							2%	
*	PFMS	2.73	1.20														
*	43	3.77	0.91														
*	44	3.43	1.14														
*	45	3.72	1.17	4	3.71	0.00	5	3.44	0.00	71	3.55	0.00				4%	
*	46	3.51	1.03														
*	47	2.97	1.07	2	3.48	0.00	12	3.17	0.00							12%	
*	PFAS	2.97	1.13	2	3.48	0.00										17%	
*	48	3.30	1.10														
*	49	2.76	1.20														
*	50	3.14	1.22	5	3.44	0.00	51	3.14	0.00							5%	
*	51	2.75	1.17														
*	52	2.04	1.26														
*	53	2.46	1.19														
*	54	3.81	1.43	14	2.45	0.00	38	3.29	0.00							2%	
*	55	3.34	1.11	15	3.32	0.00										42%	
*	56	2.99	1.16	46	3.01	0.00										1%	
*	57	2.63	1.10	51	3.14	0.00										1%	
*	RWRC	2.70	1.21	18	2.73	0.00										1%	
*	58	2.66	1.21														
*	59	3.62	1.16	29	3.49	0.00	53	3.31	0.00	66	3.32	0.00				7%	
*	60	3.71	1.31	29	3.49	0.00	66	3.32	0.00							8%	
*	EMIN	2.87	1.06														
*	61	3.03	1.13	11	2.79	0.00	17	2.82	0.00							7%	
*	62	3.31	1.24														
*	63	3.22	1.26	31	3.18	0.00	68	3.14	0.00	75	3.24	0.00				1%	
*	64	3.67	1.09	9	2.82	0.00	21	3.25	0.00	44	3.42	0.00	74	3.12	0.00	14%	
*	65	3.06	1.14	23	3.36	0.00										10%	
*	66	3.49	1.08	37	3.32	0.00	55	3.38	0.00							4%	
*	PFIM	3.36	1.13														
*	67	2.44	1.11														
*	68	3.19	1.35	18	2.73	0.00										12%	
*	69	3.17	1.23														
*	70	3.20	1.11	18	2.73	0.00										15%	
*	PRSR	3.03	1.20														

***** NPRDC SURVEY COMPARISON *****										
GS	SURVEY	SD	QUES#	SCORE	SD	QUES#	SCORE	SD	%DIFF	
QUES	SCORE	SD								
**	1	4.29	0.93							
**	2	4.40	0.93							
**	3	3.36	0.80	810	3.49	1.24			4%	
**	4	3.82	1.31							
**	5	3.36	0.97							
**	INTR	3.76	0.98							
**	6	2.95	1.30							
**	7	3.76	1.34							
**	8	3.49	1.30							
**	9	3.91	1.22							
**	EXTR	3.03	1.29							
**	10	1.99	1.35							
**	11	2.78	0.99							
**	12	2.29	1.04							
**	13	2.46	1.19							
**	14	2.51	1.22							
**	15	3.36	1.27							
**	INDV	2.56	1.18							
**	16	4.17	1.16							
**	17	3.47	1.26							
**	18	3.80	0.74							
**	19	3.81	0.96							
**	20	3.74	1.08							
**	21	3.68	1.00	3	3.50	1.65	70	2.66	1.10	15%
**	22	3.88	1.04	1	4.03	1.02	85	4.00	0.98	3%
**	GROU	3.50	1.21		2.61					25%
**	23	2.58	1.19							
**	24	3.52	1.22							
**	25	3.02	1.13							
**	26	3.99	1.25	31	3.40	1.17	37	2.82	1.17	4%
**	27	3.59	1.10	46	3.06	1.14				18%
**	PPOP	2.89	1.18							
**	28	3.59	1.21							
**	29	3.77	1.05							
**	30	3.86	0.92							
**	31	3.53	1.00							
**	32	3.39	1.00							
**	BVEX	3.63	1.04							
**	33	3.60	1.20							
**	34	3.77	1.38							
**	35	3.50	0.99							
**	36	3.33	1.17							
**	37	3.79	1.26							
**	38	3.29	1.16							
**	39	3.40	1.03							
**	40	3.08	1.09	52	3.23	1.13				5%
**	41	3.73	1.20							
**	42	3.77	0.91							
**	PFMS	3.43	1.14							
**	43	3.72	1.17							
**	44	3.51	1.03							
**	45	3.97	1.07							
**	46	3.97	1.13							
**	PFAS	3.30	1.10							
**	47	2.76	1.20	7	2.97	1.19				8%
**	48	3.14	1.22							
**	49	2.75	1.17	8	2.87	1.22				4%
**	50	2.04	1.26	9	2.61	1.18				28%
**	51	2.46	1.19	10	2.48	1.23	93	2.88	1.34	9%
**	52	2.81	1.43	89	2.93	1.33				4%
**	53	3.34	1.11							
**	54	3.99	1.16							
**	55	3.63	1.10							
**	56	3.70	1.21							
**	RWRC	2.66	1.21		2.79					3%
**	57	3.62	1.16							
**	58	3.71	1.31							
**	59	2.87	1.06	72	2.79	1.06				3%
**	60	3.03	1.13							
**	EMIN	3.31	1.24		2.81					15%
**	61	3.22	1.26							
**	62	3.67	1.09							
**	63	3.06	1.14	50	2.93	1.14	82	3.69	1.21	8%
**	64	3.49	1.08	56	2.84	1.16				19%
**	PFIM	3.36	1.13		2.94					13%
**	65	2.44	1.11							
**	66	3.19	1.35							
**	67	3.17	1.23							
**	68	3.20	1.11							
**	PRSR	3.03	1.20							
**	69									
**	70									

## Appendix H

### Survey Comments

#### Employee Survey

##### Performance awards and appraisal process

- End-of-the-year bonuses should be given based on the amount and quality of work done, not favoritism.
- Individual awards yield better incentive for increasing the productivity of a worker. However, based on my relatively short experience at NAWCADTRN (1.5 years) the general consensus is that the selection for these awards lends itself to favoritism, paybacks, and in some cases the rotation method whereby each year the award is given "to the next person on the list."
- We need a more even evaluation process.
- There is too much favoritism in the awards system. If you don't kiss-up to the head man you get nothing. So why bust your butt when someone who does nothing gets the award.
- The individual performance awards (IPA) and the performance appraisal system are very ambiguous. Many people who feel that they have done a good job and are deserving of an award are usually the ones slighted. The perception is that the "favorite" employee is the one who tends to get the award, regardless of any major accomplishments. The IPA appears very objective, but when supervisors are asked what an employee can do to qualify for an award, they are usually very ambiguous.
- There seems to be a great deal of discontent at NAWCADTRN regarding performance awards. Most people view them as being given on an "it's my turn" basis.
- The present system is good, but the implementation is poor.
- The process of "rotating" performance awards in departments should be stopped. It wouldn't hurt department heads/command-level people to give more letters of appreciation.
- The person who evaluates the QSP (Beni-Suggs) tends to become too personal and subjective.
- Individual Performance Awards appear to be given out to those that did not get one last year, or to GS-12's that have been in-grade for a long time. An individual could work as hard or harder then the last year and not get an award because they received one last year.
- It is not the amount, but the fairness with which it is distributed. The experiment a couple of years ago with \$5000 and \$10,000 awards was a flop, because of perceived unfairness. The employee has to believe the award is fairly determined before he busts his butt to get it.
- People in the trenches have little opportunity for advancement. Positions are



filled by those that go along with the flow and don't rock the boat. Positions are filled before results come out. Once a person receives a promotion there is no incentive to improve, other than pride in your work.

- We don't know who receives IPAS awards and why. This creates an air of mistrust.

### Equal rewards

- I would like to say that an equal distribution of bonus money would alleviate a number of problems here at NAWCADTRN.

- If I or the crew I work with can save NAWCADTRN money, then the savings should be shared by all. Even if the savings are \$1.00 or \$100,000.

- My work ethics are such that I would benefit from either equal or individual rewards and in turn NAWCADTRN would benefit.

- Some deserve an equal share and some do not.

- The problem with the present rating system at NAWCADTRN is that supervisors by nature rate individuals differently. An equally distributed bonus to all, based on Center performance is more equitable.

- If a performance award is given to one member of a work group, whose work went well, then all members of the work group should receive an award.

- Performance bonuses should be based on work group's performance and split evenly.

- If gainsharing (with equal shares) were to become a reality, I would expect responsibility sharing also. Some people do their jobs hap-hazardly, knowing other people will have to go behind them to do the rest of their jobs.

- In my particular work group there are people who work diligently and there are some that could contribute substantially more. If everyone performed equally then they should share in the benefits equally.

### Intrinsic motivation

- I've been in the field of aviation for over 35 years; too long to do anything but an outstanding job.

- I'm proud of what I do and to say the work was performed by me. My work as a professional will always remain the best I can do.

- There are those individuals whose work output stays the same regardless of a bonus at the end of the year.

- I do a good job because it my job my profession. Incentives should be used for improving work processes. We must have good maintenance of operating equipment. Everyone wants his family taken care of, but having a great work-day pays for itself. Being recognized for a job well done is what counts.

- My job performance is excellent and I would do the same job without a bonus, but it would be nice to get a little extra at the end of the year.

- I think that a year-end bonus is ludicrous. Pride in your accomplishments

should be reward enough.

- I always do my job to the very best of my ability. That could never be changed for any amount of money.
- I may develop a more "gung-ho" attitude if there were bonuses, but the quality of my performance and its results would be the same. But, it's always nice to have something to look forward to!
- Everyone can always use extra money. I don't exactly know how we'd change the way of doing our job to get rewarded.
- I always perform to the best of my ability. A bonus would be nice though.
- I always do the best that I can do.

### Basic pay and benefits

- The pay is not as good as it should be. We need better benefits such as dental and optical.
- We are in a critical need of an area adjustment increase in pay.
- Promotions should be given in the technical arena much more frequently. There are many well deserving engineers at NAWCADTRN who should receive GS-13's, GS-14's etc, without becoming a manager. The promotion level of our tech aces and mechanics should also be raised otherwise we will lose them.
- Government employees will get more involved in their careers once the Hatch Act is abolished. Until then, there is frustration that cannot be resolved.
- I believe if a person is hired as a GS-5 and after six months gets promoted to a GS-7, he or she should only have to spend another six months as a GS-7 instead of a year.
- I would prefer to see our compensation more closely aligned with private sector and trade unions' pay scales.
- There is no doubt that federal pay at the GS/GM levels falls far short of private industry pay as documented by numerous studies. Likewise, studies have recommended an overhaul of government health benefits. Why not use federal employee monetary clout to negotiate only one or two more attractively priced plans as private industry does.
- Our pay is 28% behind the private sector. This is very disheartening. Pay and benefits are critical, because our incentive system is so bad.

### Survey feedback

- Thank you for your survey. I hope something comes out of it.
- More people should have been asked.
- I seriously doubt you or anyone else cares less about the survey or my comments; there's just nothing you can do!
- I felt I could have answered these questions more clearly if they were more generally applied to our branch.
- Please provide the results of the Survey in the NAWCADTRN Newsletter. So

everyone can know them.

- I answered these questions without a clear understanding of the goal to be achieved with this Survey.

### Employee involvement

- I believe that the TQM program, although good in theory, was a major waste of money. The workers have little or no control over what happens.
- The term "quality" is being overused so much, both in government and in private industry, that its true meaning is basically diluted, poorly understood and is on the verge of becoming a joke.
- There are too many teams trying to solve too many problems at the same time. The result, people dilute their energies in many tasks and none of them ever get finished.
- There is too much emphasis on team players. While a good team is important, there must be a leader. There are very, very few leaders.
- TQM is a great idea, but it is restricted by a budget. Suggestions are not implemented because of this.

### NAWCADTRN praise

- I feel NAWCADTRN is an excellent facility; I enjoy working here. The people are all professionals, most people want to do a good job even in spite of the lack of recognition. Any incentive would only add to the total performance of individuals.
- I love it here!!! I left once and was sorry.
- I believe NAWCADTRN does the best it can for employees.

### Improvements to incentives

- We need an Accelerated Performance System (APS) for the competitive federal employee. Sure, pay for performance is the way to go! But how do we measure performance? For the most part satisfactory performance is what keeps the wheels of government turning, unfortunately very slowly. We must find a way to reward the progressive, action-oriented employee.
- In my opinion, NAWCADTRN and all government facilities should operate like the private companies. The private company's goals are; make money, better quality, better service, or else shut down or layoff. Reward based on these.

### Communications

- Things just take so long to get done (e.g., ordering equipment, travel orders, etc). Supervisors need to communicate more with their respective groups.
- My work group has never received a bonus, nor have I. Recently, I found out

performance bonuses were given in my area.

#### Size of payouts

- Shares must be large enough to be meaningful.
- The money in pool must be a substantial amount. \$25-100 is not doing anything for anyone. Use small amounts like these for luncheon, dinner party, or free pretzels or donuts every Friday.

#### Management Survey

##### Performance awards and appraisal process

- At NAWCADTRN performance ratings, awards and bonuses are mostly excellent and awarded to the maintenance and engineering side and not the support personnel. I personally find this very unfair.
- PGS should enhance (but not totally replace) our current recognition system.
- Productivity improvement awards are the way to go. We should reward improvements by rewarding the function that has proven improvements. The function will then invest this money back into their function.

##### Intrinsic rewards

- Money would not be the sole motivator, even an "attaboy" would do. If I could see any changes to the way I do work to improve effectiveness, I would make those changes (continuous process improvement).
- I would basically continue to perform as I always do. But if some small (identifiable) change could make a difference; why not?

##### Communications

- Organizational goals are conveyed only at the department level.

##### Military

- As a military member, I am not eligible for bonuses but my employees are. Also my health benefits are fixed. I do think a PGS system would be beneficial but determining a measure may be difficult due to the uniqueness of Center work.

Appendix I

Estimated Savings Due to Efficiency Improvements at NAWCADTRN

MEASURE	EXPLANATION	BENEFIT S
1) SETA Check List	Improved checklist to improve scheduling proficiency.	680 Manhours per year
2) Errorless Drawings	Improved check on drawings to reduce drawing and material rework.	1456 Manhours per year
3) CAD/CAM Use	Saves time in developing drawings.	252 Manhours per year
4) Tactical Board Rescheduling	Improved process for managing test cell projects.	156 Manhours per year
5) SMT/KRA Improvements	Many improved processes as part of the strategic planning process.	960 Manhours per year
6) Telcom	Modify phone system for better efficiency.	2590 Manhours per year
7) OP Shop Scheduling	Process improvement resulting in more efficient workload planning and exec.	480 Manhours per year
8) Turning Gear	Change in testing setup process to reduce idle time.	600 Manhours per year \$TBD in Utility Savings
9) OP Maintenance Control	Process changes to maintenance procedures and tool use.	2500 Manhours per year

10) Dual Cell Operations	Process and policy changes to testing will enhance productivity.	1560 Manhours per year \$TBD in Utility Savings
11) Power Management	Improved power utilization	0 Manhours per year \$TBD in Utility Savings
12) CNC Machines	CNC machines will increase efficiency/quality and reduce contractor reqs.	768 Manhours per year \$2000 in contracts
13) Tag-Out Procedures	Improved communications to reduce equipment delays.	640 Manhours per year
14) Safety IG Teams	Many PATs defined solutions to identified safety problems.	1750 Manhours per year Training/safety impr.
15) Standards for Duct Fabrication	PAT defined improvements to duct installation.	576 Manhours per year
16) Dimensioning in the Field	Change process to allow workers to make mods right on test stand.	1080 Manhours per year
17) Rough Out Procedures	Manufacturing process improvements between different shops.	400 Manhours per year
18) Ventilation Improvement	Better ventilation will make workers more productive.	240 Manhours per year

19) Tri-Org. Study	Use more advanced equipment at sister organization.	64 Manhours per year
20) Quality Suggestion Program	Average yearly savings from quality suggestions.	1750 Manhours per year \$12,500 material savings
21) Systems Checks	Modified systems check procedures for testing.	625 Manhours per year
22) OP/PE Certification	Training program for engineers to decrease redundancy and guess work.	2800 Manhours per year
23) TQL In-House Training	Use Center employees as TQL facilitators vice contractors.	\$2000 in contracts
24) Quarterly Budget Review	Practicing effective meeting principles to shorten meetings.	160 Manhours per year
25) TQMC Actions	Practicing effective meeting principles to shorten meetings.	160 Manhours per year
26) Timely MIS Reports	Saves program manager time seeking late information.	60 Manhours per year
27) QA Activity	Practicing effective meeting principles to shorten meetings.	80 Manhours per year
28) OP Tool Crib	Change control of crib to users to improve communications.	52 Manhours per year
29) Comptroller	Improve disbursing, travel, and obligations and use contractors.	2625 Manhours per year \$2000 in contracts

30) Night Shift Cabinets	Organize and relocate tool cabinets to reduce search time.	90 Manhours per year
31) 1348 Processing	Improving form processing and buying new software.	1250 Manhours per year
32) Public Works Requests	Improve communication process for requesting work and checking status.	200 Manhours per year
33) Timekeeping	Improve processes and reduced conflicts.	1200 Manhours per year
34) Incoming Correspondence	Reduce the flow of correspondence by 10 percent.	182 Manhours per year
35) Purchase Requests	Creating a central filing system and improved communications.	100 Manhours per year



## Appendix J

### Supplemental Survey Analysis

#### Introduction:

A comprehensive survey analysis was performed as part of the research methodology for this thesis. However, it was determined that there were many other analytical techniques that could have been used to provide a more rigorous approach to assessing the survey data collected. Dr. Markham, from this thesis committee, provided direction on a few of the more useful techniques to analyze survey data. These techniques were used in this supplemental survey analysis and are described in this appendix.

There are many methods that can be employed to identify survey themes/commonalities to uncover the beliefs of interest from a targeted survey group. The quality of the survey can also be improved by confirming pre-defined survey constructs and identifying new ones, using several of these methods. Some techniques can help remove survey questions that are spurious or unimportant to the constructs of interest.

The survey conducted in this thesis was analyzed strictly through a simple assessment of means and standard deviations. These results are shown in Table 4.1 and Table 4.2 and the analysis in Section 5.1. No assessment was made on the correlation's between questions/constructs or their particular relevance to overall information requirements. Thus, an attempt was made in this supplemental survey analysis to determine some of these correlation's, which helped define several survey constructs. Several analytical tools such as: coefficient alpha, correlation analysis, reliability analysis, and factor analysis were employed to further assess survey results and to gain a working knowledge of the powerful potential of these tools.

#### Background:

To perform a full and comprehensive analysis of the survey results, one would probably attempt to do the following:

- confirm the top-level information requirement of the survey
- break down the survey into six to eight overall constructs
- remove any insignificant questions.

If a thorough job was done when developing the survey, the original survey constructs should match the newly defined ones fairly closely and not many extraneous questions would exist. The constructs will contribute to a better knowledge of the survey group with regard to the top-level information requirement.

Relations between questions can first be examined using one of many correlation techniques. The extent of correlation between questions will normally fall between

negative one and positive one. If two questions have a high negative correlation ( $< -0.7$ ), they indicate opposite themes, but the responses can be transposed to form a positive correlation of the same magnitude. This means that most people scoring high on the one question tended to score lower on the other one. Questions that have a high positive correlation ( $> 0.7$ ) indicate common themes. Using 0.7 is a commonly accepted “rule of thumb” for a high confidence level of correlation. Constructs can then be postulated based on groups of questions having a high correlation.

A reliability analysis can then be performed on the questions making up the constructs by calculating the coefficient alpha for that group of questions and how each individual question will impact a change in this alpha. In this case, a cronback alpha was used which calculates the average of inter-item correlations. A group of highly correlated question can then be formed as a result and spurious questions can be discarded.

Factor analysis is another technique to define factors or constructs within a group of questions. Eigen value are calculated, which define the strength of particular factors in a group of questions. Eigen values over one are considered to be significant. The relation of each question to the significant factors is then calculated and questions can be assigned to the factors with which they have a strong contribution. Factor analysis can also be used to validate the constructs formed through reliability analysis or some other method. This is a powerful tool which can identify the major factors for an entire survey. Factor Analysis is generally not be performed on a large set of questions because as the list of questions grows, the number of calculations and comparisons grows exponentially. So performing factor analysis on an entire survey becomes extremely computation intensive.

The last analysis tool that was examined for this supplemental survey analysis was the One-Way Analysis of Variance (ANOVA). This technique helps to compare similarities and differences between certain constructs, along with between groups of respondents. Comparisons are considered statistically significant with a  $p$  value  $< .05$ , which indicates a 95% confidence level that similarities are not due to random chance. When examining constructs having a high confidence level, a pattern will form between the two groups of questions. This enables the researcher to determine how issues are related for the survey group in question.

#### Construct Formation:

A sample analysis was performed on the gainsharing survey data, based on the potential value and complexity of the previously mentioned analytical tools. If a great deal more time existed to devote to this effort, this analysis would have been much more comprehensive. Instead, these tools were used in a sampling fashion.

The highest level information requirement for this survey was to determine if the employees at NAWCADTRN possessed the values that would facilitate a successful gainsharing system, such as: team-focus, improvement-orientation, and pride in their

work. The other high level requirement was whether they would accept gainsharing. All survey constructs should provide information in support of these requirements.

First, using the Pearson Product Moment method, a correlation matrix was constructed on all 70 questions (a 70 x 70 matrix). This defined correlations between each question and helped to uncover several highly correlated groups of questions. All pairs of questions having a high correlation (> 0.7) are shown below in Table J.1.

Table J.1 Correlation Matrix (Highest Values)

Q1	Q2 (.77)	Q10	Q13 (.70)	Q26	Q27 (.70)
Q1	Q35 (.80)	Q12	Q14 (.72)	Q36	Q37 (.74)
Q2	Q3 (.70)	Q13	Q46 (.73)	Q52	Q54 (.70)
Q2	Q35 (.71)	Q16	Q17 (.74)	Q52	Q58 (.72)
Q9	Q16 (.70)	Q17	Q18 (.78)	Q57	Q60 (.72)
Q9	Q41R (.76)	Q17	Q67 (.73)	Q65	Q66 (.70)

As a result of this correlation matrix, the first construct selected to examine was the first original construct of the gainsharing survey, which was "Intrinsic Motivation." This consisted of five questions (1, 2, 3, 35, and 36). A reliability analysis was then performed on these questions and showed that without question 36 (Q36), this group of questions formed a highly correlated construct for Intrinsic Motivation. Deleting each question individually yielded a low negative coefficient alpha of between -0.2 and 0.0. When question 36 was removed, the coefficient alpha was almost 0.9 for the group, which indicates extraordinary correlation for those four questions. The correlation matrix of those four questions in the new Intrinsic Motivation construct had alpha values between 0.54 and 0.81. More valid assessments can be made from this modified construct than that of the original construct.

A Factor Analysis was then performed on the set of question making up the original Intrinsic Motivation and Extrinsic Motivation constructs (9 questions total). Two significant factors emerged having eigen values greater than one. Factor 1 had an eigen value of 4.56 and Factor 2 was 1.63. The questions contributing highly to Factor 1 were 1, 2, 3, and 35, which was the new Intrinsic Motivation construct. The group of questions forming Factor 2 were highly negatively correlated to Factor 1. These were questions 36, 37, 38, and 4, which was the original "Extrinsic Motivation" construct with the exception of Q5 being replaced by Q36. So it appears that the Intrinsic and Extrinsic Motivation constructs were not separate and distinct, but merely opposite constructs. Insight into the second factor was gained by examining question 5, which had a high negative correlation

to the second factor. Since the wording on Q5 talked about fellow employees being driven solely by their paycheck, Factor 2 is probably dealing with fellow employees (as opposed to the individual) being committed to performing their jobs well without a monetary driver (low extrinsic motivation).

It was decided to then examine the issue of the employee's commitment to their job. Q15 seemed to represent the theme behind the this construct fairly well. By examining the correlation matrix, Q48 and Q49 seemed to be related to Q15. These (3) questions made up part of the original "Behaviors Exhibited" construct. The other two questions in this construct (Q16 and Q50) didn't correlate with these three items, thus were dropped from consideration for this construct. A reliability analysis was performed on this set of (three) questions and the cronback alpha was found to be 0.80 for the group, which indicated the basis for another construct. This new construct was then titled, "Individual Work."

Since Q16 and Q50 were correlated with each other, it was postulated that these formed the basis for another construct dealing with the coworker's commitment to their jobs. Through an examination of the coefficient alpha matrix, Q41 had a high negative correlation to these two questions, so the response data was reversed to form an item called Q41R. The coefficient alpha was calculated to be 0.73 for the group, which was high. Thus forming a third construct entitled, "Organizational Work."

#### Construct Comparison:

The three constructs developed: Intrinsic Motivation, Individual Work, and Organizational Work, were then compared with each other. In addition to these constructs, it was felt that Q70 was a very important question, asking what dollar amounts would motivate employees to change the way they performed their jobs. The desired theme for this question was to define monetary levels that would motivate employees to improve the way they do their jobs. It was realized during this analysis that respondents could possibly interpret the wording as what amount of money would make you reduce job performance. It was assumed that this was not a significant issue though. It was also important to compare the results of the employees with those of management. In the original analysis, the means on some of the questions/constructs were significantly different between these two groups.

A One-Way ANOVA was used to compare the results of the three constructs formed in this exercise and Q70 with each other. This analysis was also broken out into management vs. employees to determine if significant differences existed between the two groups. This analysis could have been enhanced a great deal if more demographic information was collected as part of the survey. Information such as: experience, gender, department, etc. would have been quite valuable in determining if certain population groups had any patterns existing within the constructs. The following table shows the results of this comparison.

Table J.2 One-Way ANOVA Results

	Intrinsic Motivation	Individual Work	Organizational Work	Question 70	Question 70 Dichotomous
Level	<b>0.0081</b>	0.1093	<b>0.0585</b>	0.3327	0.1818
Question 70	<b>0.0049</b>	0.9131	0.4063		
Q70 Employees	<b>0.0028</b>	0.8782	0.4277		
Q70 Management	0.5326	0.9626	0.4276		
Question 70 Dichotomous	<b>0.0088</b>	0.8028	0.9257		

The  $p$  values  $<.05$  are shown in bold. There is a significant difference between Intrinsic Motivation when examining Levels in the organization. This is also true for Intrinsic Motivation compared with Q70. It is obvious when Q70 is broken down to levels of the organization that this is due solely to the employees. Those not answering Q70, (termed Q70 Dichotomous) were found to closely relate to Intrinsic Motivation. Organizational Work was also found to show significant differences between the levels in the organization.

A Duncan test was performed on the relation of Q70 to Intrinsic Motivation and two distinct groups seemed to form. It was determined that the people who answered on the lower end of Q70 (lower dollar figures to motivate to change performance) tended to correlate with lower means for intrinsic motivation. Those with a higher intrinsic motivation would be motivated by higher sums. This is consistent with the original assumptions for the survey. Intrinsic motivation was also highly correlated with those not answering Q70. Those that didn't answer Q70 had a much higher level of Intrinsic Motivation when compared with those that did. This makes sense because it is assumed that those with a very high level of intrinsic motivation would not be influenced by any sum of money, within reason.

It was interesting to note that with Intrinsic Motivation's relation to Q70, the employees were highly associated, showing a very low  $p$  value. However, management had no such pattern form. It was determined that management had a higher level of Intrinsic Motivation than the employees, but there was no relation between Intrinsic Motivation and the dollar amounts that would motivate NAWCADTRN managers. This is consistent with the findings from the original survey analysis.

The Organizational Work construct was found to be significantly related to levels in the organization. Although it is normally accepted to use a  $p$  value of  $<0.05$ , for the purpose of this exercise it was felt this number was close enough. Management appeared to have a much more positive perception of how hard the people of the organization are willing to work when compared to how the employees felt about this issue.

## Conclusion:

This particular exercise was just a sampling of questions to define several constructs, which were formed with only 3-4 questions. To do a comprehensive analysis, all questions should be examined. The 70 x 70 correlation matrix could be used to further enhance these constructs and to develop new ones. A more detailed reliability analysis could help formulate and validate other constructs making up this survey and factor analysis could be used to further develop these new constructs. This may help to confirm several of the remaining original constructs from the survey and possibly develop new ones. There were several highly correlated groups of questions shown in Table J.1 which could provide a basis for forming more survey constructs.

This supplemental analysis was extremely beneficial in confirming several of the constructs from the original survey. The survey analysis techniques that were examined, and then used, definitely demonstrated a huge potential for formulating important and relevant conclusions from the survey data. This would be important in determining NAWCADTRN's readiness for gainsharing and assessing employee values. It highly recommended to plan for the use of these survey tools when developing any survey and then use them to perform an effective survey analysis and possibly improve the survey itself.

## VITA

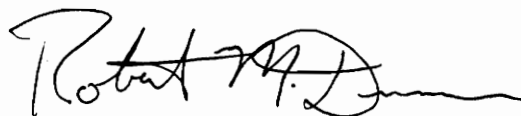
Although I have not attended formal courses at Virginia Tech in several years, I still associate myself strongly with the University. Finally finishing this thesis and earning a Master of Science Degree in Industrial and Systems Engineering is an extremely important milestone for me. The Management Systems Engineering option has proven to be very challenging and rewarding.

I graduated from Penn State in 1987 with a Bachelor of Science Degree in Aerospace Engineering with a Mathematics minor. My goal was to work as lead systems engineer on large aerospace programs, so I chose to pursue Industrial and Systems Engineering at Virginia Tech. Upon completion of my classwork, I secured a position as an Aerospace Engineer with the Naval Air Warfare Center and progressed into a Program Manager position. Initially I worked in propulsion Science & Technology, then I was given the opportunity to work on systems engineering issues. I was appointed lead engineer on an initiative to integrate supportability issues into future Navy propulsion systems. My responsibilities grew to include the manufacturability and affordability of these systems. I am presently Program Manager for Reliability & Maintainability, Supportability and Manufacturability, and Affordability of Advanced Propulsion Systems.

I rely heavily on my experience as a graduate student. The course work in the Management Systems Engineering option and my work as a Research Associate with the Virginia Productivity Center provided a strong background in organizational improvement and management system design. My thesis work helped provide a familiarization with the complexities of management systems in government, RDT&E organizations. My focus on incentives/gainsharing supplied me with an intimate look at important issues that concern all employees.

I am in the process of obtaining my Professional Engineer license in Industrial Engineering and intend to pursue a Ph.D. in Systems Engineering in a few years. I will

pursue both a management and technical path in systems engineering and hope to be able to teach these principles at the university level in several years. I truly believe that completing a graduate-level course of study at Virginia Tech in Industrial and Systems Engineering was one of the best decisions I have made to date.

A handwritten signature in black ink, appearing to read "Robert M. Dunn". The signature is fluid and cursive, with a large initial "R" and a long, sweeping underline.

Robert M. Dunn