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An analysis of Zero Defects programs and employee motivation.

Miller, Winston Burdette

George Washington University

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by

Winston Burdette Miller

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Winston Burdette Miller

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Thesis directed by

Geza Peter Lauter, Ph.D.

Assistant Professor of Business Administration

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CHAPTER I

INTRODUCTION

One of the basic problems that confronts management in any organization is that of motivating people to work. Along with other functions of management, i.e., planning, organizing, and controlling, motivating is an important determinant of the level of employee performance which, in turn, influences the effectiveness in achieving organizational goals. In order to effectively and efficiently motivate people to work toward the goals of an organization, it is necessary for management to have some understanding of human behavior. The behavioral scientists have made many contributions in helping management to work with and through people.

Notwithstanding the advances made in the past forty years, much remains to be learned about what motivates people in work situations. Many theories have been presented as to what motivates people. Many of these theories have resulted in management programs of various types being implemented to

improve the motivation of its employees. One such program that has caught the imagination of many managers in the past eight years is the Zero Defects program. Although various names have been applied by different companies, e.g., Personal Responsibility In Daily Effort (PRIDE) and Total Error Elimination (TEE), Zero Defects (ZD) is the most prevalent.

In 1962, Martin Marietta Corporation's Martin Company at its Orlando, Florida, division developed and implemented the first Zero Defects program. The purpose of the program was to eliminate errors in the design and production of missile systems for the United States Army. It was carried out by trying to instill in every individual in the company a constant, conscious desire to do their work right the first time. The Martin Company obtained excellent results with the program. Not only did the quality of their products improve, but their costs were also reduced.

The success of the Zero Defects program at the Martin Company prompted others, both in industry and in government, to introduce such a program in their organization. Although Zero Defects has not been universally adopted in industry nor throughout government, its users include practically every

size of company and every type of industry and business. In spite of its success, there has been considerable controversy over Zero Defects programs. This controversy has centered primarily on whether or not Zero Defects programs are effective in motivating employees. The proponents maintain the accomplishments of the program establish a prima-facie case for the motivational benefits which can accrue from a Zero Defects program. Opponents argue that Zero Defects is an attempt to deal with basic management functions by means of a "gimmick" rather than a sound, logical approach.

Objectives of the Study

It is the purpose of this paper to analyze the Zero Defects program as a management technique for motivating employees. This analysis is conducted by considering the answers to the following questions:

1. What are some of the more significant approaches to the motivation of employees in the work situation?

2. In view of the many and varied approaches to motivation, how can a manager confront the problem of employee motivation?

3. What is a Zero Defects program?

4. How does the motivational aspect of a Zero Defects program compare with the more significant approaches to motivation?

5. What results have been obtained by users of Zero Defects programs?

Some of the more significant approaches to motivation are included in order to establish a perspective and a broader understanding of motivation. There has been no attempt to include in this paper all existing thought and opinion with respect to the field of motivation. However, a synthesis has been developed based on the research conducted and the material examined. The writer hopes the discussion of motivation will promote a better appreciation of the broad and complex nature of motivation, in addition to forming the basis for the conclusion reached regarding Zero Defects programs as a motivational tool of management.

Limitations of the Study

Research for this paper consisted primarily of library research supported by some collection of information in the

Department of Defense. The library research was used to reveal the various approaches to motivation and the Zero Defects program. There has been very little material published which gives a complete coverage of Zero Defects programs other than a book, written by James F. Halpin, Director of Quality, Martin Company.[1] The treatment of Zero Defects programs has, therefore, been limited primarily to Halpin's book and information obtained in the Department of Defense. The information in the Department of Defense was obtained within the Office of the Assistant Secretary of Defense (Installations and Logistics) and the Naval Supply Systems Command from written reports and personal interviews.

Order and Nature of the Presentation

The organization of this research paper is intended to lead to an evaluation of the Zero Defects program as a motivator of employees at work. Chapter II sets the stage for the study by discussing the motivation of individuals. Motivation is defined, and the importance of motivation on performance is considered. A historical survey is made of the more significant approaches to the motivational process. The management writer

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[1]James F. Halpin, Zero Defects: A New Dimension in Quality Assurance (New York: McGraw-Hill Book Company, 1966).

or behavioral scientist who made the major contribution to each approach is included in the discussion. The chapter concludes with a suggested approach to be taken by managers for motivating their employees.

Chapter III focuses on the Zero Defects program. The importance of defects is discussed from both an individual viewpoint and from the viewpoint of the organization. Included in this discussion is a brief review of the responsibilities for quality control in an organization. Next, the philosophy of Zero Defects is presented along with the purpose and objectives of the program. In conclusion, the techniques used in Zero Defects programs will be identified in order to provide a complete picture of Zero Defects as it is currently applied by industry and government.

In Chapter IV, Zero Defects programs are discussed as a motivational tool of management. Zero Defects is compared with each of the various approaches to motivation which were discussed in Chapter II. This comparison is made to determine if the Zero Defects concept is compatible with one or more of the various approaches. Next, the results of Zero Defects programs are surveyed. This section includes results

reported by various organizations that have ZD programs and results of studies to determine employee opinion of ZD.

Some conclusions are reached in the final chapter (IV), regarding the Zero Defects program as a management technique for motivating employees. These conclusions are based on the discussions of motivation, Zero Defects programs, and the comparison of the motivational aspects of Zero Defects and the more significant approaches to motivation.

CHAPTER II

MOTIVATION IN THE WORK SITUATION

Definition and Importance of Motivation

The word "motivate" is defined in the dictionary as, "To provide with a motive; to impel; incite".[1] When motivation is used in the organizational context, it relates to the process by which people are stimulated to action toward the accomplishment of the organization's goals and objectives. As indicated in the introduction, this process is a responsibility of management, and it is one of management's basic problems.

Before discussing some of the more significant approaches to the motivation process, it will be helpful to look at the other side of the coin of motivation, i.e., from the viewpoint of the individual. The motivation of an individual depends on the strength of his motives. The dictionary defines motive as, "That within the individual, rather than without, which incites him to action; any idea, need, emotion, or

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[1]Webster's New Collegiate Dictionary (2nd ed.; Springfield, Mass.: G. & C. Merriam Co., 1949), p. 550.

organic state that prompts to an action."[1] Motives are directed toward goals, which may be conscious or sub-conscious. They are the whys of behavior in that they arouse and maintain activity and determine the general direction of an individual's behavior.[2]

An individual's strength of motivation to perform some act is a function of:

1. The strength of the motive which is the position of a motive in the individual's hierarchy of motives, representing a level of urgency for fulfillment.
2. Expectancy which is the probability that the act will obtain the goal.
3. The value of the incentive which is the rewards hoped for by obtaining the goal. The greater the rewards, the greater will be the motivational strength, providing the other two factors remain equal.[3]

Incentives can be either extrinsic or intrinsic. Examples of extrinsic incentives are pay, benefits, and clean surroundings. Praise, sympathy, approval, and feelings of achievement are examples of intrinsic incentives. Both kinds of incentives to be effective must be appropriate to the need

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[1]Ibid.

[2]Paul Hersey and Kenneth H. Blanchard, Management of Organizational Behavior (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969), p. 10.

[3]William G. Scott, Human Relations in Management: A Behavioral Science Approach (Homewood, Illinois: Richard D. Irwin, Inc., 1962), p. 83.

structure of the person involved.[1]

The motivation of an individual is distinguished from other factors that also influence behavior, such as the past experiences of the person, his physical capabilities, and the environmental situation in which he finds himself. However, it is important for managers to realize and to take into account these other factors because they can influence an individual's motivation.

The effect of individual motivation on the management function of motivation should be clear. That is, if the motivational process is to be efficient as well as effective, management must satisfy human needs in addition to stimulating people toward the accomplishment of the organization's goals and objectives. Douglas McGregor stated in this regard:

> A statement of strategy that has long seemed to me to be consistent with the goals of economic enterprise on the one hand, and with behavioral science knowledge of the motivational nature of man on the other, is this: Management must seek to create conditions (an organizational environment) such that members of the organization at all levels can best achieve their own goals by directing their efforts toward the goals of the organization.[2]

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[1]Hersey and Blanchard, Management of Organizational Behavior, p. 11.

[2]Douglas McGregor, The Professional Manager (New York: McGraw-Hill Book Company, 1967), p. 11.

Significant Approaches to Motivation

The problem of motivating workers did not exist in the United States until about the turn of the twentieth century. Prior to this businesses had few if any employees other than the members of the family. However, with the turn of the century big business with large numbers of employees was very much in evidence. This generated an "apartness" between management and labor, and the management problem of motivation soon became apparent. Although managers were concerned about the lack of motivation, they did little or nothing about it. They viewed wages as the primary motivating force behind employee action. Money and motivation were synomymous. This approach to the problem of motivation was the only one of any consequence that was used by management until the 1930's.

In the 1920's, psychologists became interested in the problem of motivation in the work environment and began conducting research in this area. Since the first of these studies, the well-known work of Elton Mayo at the Hawthorne plant of Western Electric, managers have been overwhelmed with numerous theories to improve motivation.

There is no unanimity as to whether or not all or any of

the approaches to motivation can solve the problem of creating a situation in which employees can satisfy their individual needs while at the same time accomplishing the goals of the organization. There are those who contend that although the work environment has been improved, motivation to do better work has not been clearly and universally generated.[1] It seems all the more appropriate, therefore, that the more significant approaches to motivation be understood before any evaluation can be made regarding the Zero Defects program as a management technique for motivating employees.

Economic Approach

The assumption of this approach to motivation is that the only reason people work is to earn money. It assumes that in the work situation the only need that an individual has is economic, i.e., to earn a wage to satisfy his basic requirements for food, clothing, and shelter. Therefore, this need is the only one which it is necessary for management to satisfy in order to motivate him toward the accomplishment of the organization's goals. Management can control the behavior of

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[1]Harold Koontz and Cyril O'Donnell, Principles of Management: An Analysis of Managerial Functions (4th ed.; New York: McGraw-Hill Book Company, 1968), p. 572.

employees by granting or withholding monetary incentives. This approach further assumes that man's feelings are essentially irrational and must be prevented from interfering with his rational calculation of self-interest.

Implied in these assumptions are some additional ones which have been made explicit by Douglas McGregor in his Theory X:

1. The average human being has an inherent dislike of work and will avoid it if he can.
2. Because of this human characteristic of dislike of work, most people must be coerced, controlled, directed, threatened with punishment to get them to put forth adequate effort toward the achievement of organizational objectives.
3. The average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, wants security above all.[1]

The foundation of this approach to motivation was laid by Frederick W. Taylor's concept of scientific management. He set forth four principles of management:

1. Develop a science for each element of a man's work, which replaces the old rule-of-thumb method.
2. Scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could.
3. Heartily cooperate with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed.
4. There is an almost equal division of the work and the responsibility between the management and the

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[1]Douglas McGregor, The Human Side of Enterprise (New York: McGraw-Hill Book Company, 1960), pp. 33-34.

> workman. The management takes over all work for which they are better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.[1]

Although his writings showed that he had the best interests of the workers at heart, his mechanisms of management revealed the worker's true role was to perform as directed by management. Examples of his mechanisms of management are:

1. Time and motion studies to measure how long it should take a worker to perform his various functions.

2. The "differential rate" to acknowledge that different jobs involve varying degrees of difficulty to perform them, and to relate the rate of payment to the level of difficulty.

3. Instruction cards for the workman to insure he knows what management requires of him.

4. Standardization of tools and implements to provide for efficiency.[2]

All of these mechanisms were designed to increase

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[1]Frederick W. Taylor, Principles of Scientific Management, trans. by Claude S. George, Jr., The History of Management Thought (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1968), p. 90.

[2]Ibid., p. 91

production, and to give management better control over the worker.

Many modern observers have an inherent tendency to condemn this approach to motivation because of its assumption about the nature of man. However, it must be acknowledged that the economic approach has proven to be a successful motivator of human effort in many kinds of organizations.[1]

Hygenic Approach

The hygenic approach to motivation in many ways is merely an expansion of the economic approach. It originally developed in the form of employee welfare programs, where management attempted to satisfy employees by giving them high wages, fringe benefits, good working conditions, and good supervision. They felt that a satisfied employee would work harder.

This approach was adopted initially for two reasons. First, there was an increasing management interest in their employees. Second, there was an increase in unionism to

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[1]Edgar H. Schein, Organizational Psychology (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 50.

represent employees in their negotiations with management.[1]

An extreme form of the hygenic approach to motivation was paternalism. It assumed that employees would work harder out of loyalty and gratitude as a result of the various projects undertaken by management to help improve the employees' personal lives as well as their work. These projects ranged in nature from cooking classes for employees' wives to helping them manage their finances.[2] Paternalism was used by management primarily during the 1920's, and it is seldom seen today.

In contrast to paternalism, the hygenic approach is still very much in evidence today. However, many people question its motivational aspects because employees begin to take the benefits for granted since all share equally in them. Therefore, there is no incentive to do better work. Further, the motivational aspects of this approach have been questioned in the light of Herzberg's theory of satisfiers as opposed to motivators in the motivational process. The work of Herzberg will be reviewed in the section on the self-motivation approach.

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[1]Leonard R. Sayles and George Strauss, Human Behavior in Organizations (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 141.

[2]Ibid.

Social Approach

The social approach to motivation emphasizes the social needs of man in the work environment. It acknowledges that a manager should be concerned with his employees' feelings, especially those regarding his social needs, i.e., acceptance, identity, and sense of belonging. It recognizes the importance of informal worker groups, and maintains management should utilize these groups to advantage in the motivational process. This approach envisions the role of the manager as that of providing a supportive climate for employees to develop a drive to contribute and improve themselves.

The social approach was first suggested as a result of the classical experiments of Elton Mayo at Western Electric Company in the late 1920's, and early 1930's. As mentioned earlier, Mayo's was the first significant research in the field of human motivation in an industrial setting. His contributions to the study of motivation have not only been profound, but as stated by Saul Gellerman, "Nearly every major theorist in human relations since Mayo has used him either as a springboard or as a foil against which to develop contrasting ideas of his own".[1]

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[1]Saul W. Gellerman, Motivation and Productivity (American Management Association, 1963), p. 19.

Mayo developed a set of assumptions about the nature of man which are quite different than those concerning man in the economic approach:

1. Man is basically motivated by social needs and obtains his basic sense of identity through relationships with others.
2. As a result of the industrial revolution and the rationalization of work, meaning has gone out of work itself and must therefore be sought in the social relationships on the job.
3. Man is more responsive to the social forces of peer groups than to the incentives and controls of management.
4. Man is responsive to management to the extent that a supervisor can meet a subordinate's social needs and needs for acceptance.[1]

In addition to the work of Mayo, there have been many other studies conducted which support the use of the social approach to motivation. One such study was made by Abraham Zalesnik, et al. They conducted a study of informal groups in one department of a manufacturing company. The following results were obtained:

1. Acceptance by the group was the most powerful motivator, not the incentives which management offered.
2. Group membership meant the individual was abandoning his chances for growth and for a measure of pride because of group standards.
3. Group membership protected the member from being isolated from his fellow workers.
4. Nonmembers who produced above average were trying

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[1]Schein, Organizational Psychology, p. 51.

to get revenge against the group, not because of any efforts of management.

5. Group membership provided a sense of belonging and an escape from anonymity.[1]

Another study which supports this concept was conducted by Rensis Likert. He distinguished between two types of supervisors, employee-centered and job-centered. The employee-centered supervisors focused their attention primarily on the human aspects of their subordinates' problems and on endeavoring to build effective work groups with high performance goals. In contrast, the job-centered supervisor tended to concentrate pushing their employees through a work cycle in a prescribed way and at the rate determined by time and motion studies. Likert found that the departments with employee-centered supervisors tended to produce more than those with job-centered supervisors.[2]

Self-Motivation Approach

The self-motivation approach is the most recent approach to motivation as it has evolved primarily from research by

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[1]A. Zalesnik, C. R. Christensen, and F. J. Roethlisberger, The Motivation, Productivity, and Satisfaction of Workers: A Prediction Study, trans. by Gellerman, Motivation and Productivity, p. 56.

[2]Rensis Likert, New Patterns of Management (New York: McGraw-Hill Book Company, 1961), p. 7.

behavioral scientists in the past six years. This approach is also the least tried by management because in addition to being relatively new, it is the most difficult to practice. It requires management to use a strategy similar to that used in the social approach, but with the additional step of making the employees' work intrinsically more challenging and meaningful. It is an attempt by management to build a feeling of mutual contribution by all members of the organization toward the organizational goals. The basis of motivation shifts from management trying to provide extrinsic rewards to motivate the employees to that whereby management provides an opportunity for the employee's existing motivation to be directed toward organization goals.[1]

This approach makes the assumption that man's needs appear to be arranged in a hierarchy. The hierarchy of needs was developed by Abraham Maslow and are as follows in ascending order from lowest to highest level:

1. Physiological which are the basic human needs to sustain life itself--food, clothing, and shelter.
2. Security which are those required for self-preservation--to be free of the fear of physical danger and deprivation of the basic physiological needs.
3. Affiliation which are those associated with the

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[1]Schein, Organizational Psychology, p. 57.

social nature of man--belonging and acceptance.
4. Esteem which are those required to produce feelings of self-confidence, prestige, power, and control--both self-esteem and recognition from others.
5. Self-actualization which is the need to maximize one's potential, whatever it may be--the desire to become what one is capable of becoming.[1]

Maslow contends an individual is concerned with satisfying each level of the hierarchy of needs beginning with the lowest before he moves to the next higher level of needs. However, it is not necessary for one level of needs to be completely satisfied before the next level becomes predominant for an individual.

Three other assumptions of the self-motivation approach are:

1. Man seeks to be mature on the job and is capable of being so. This means the exercise of a certain amount of autonomy and independence, the adoption of a long-range perspective, the development of special capacities and skills, and greater flexibility in adapting to circumstances.
2. Man is primarily self-motivated and self-controlled; externally imposed incentives and controls are likely to threaten the person and reduce him to a less mature adjustment.
3. There is no inherent conflict between self-actualization and more effective organizational performance. If given a chance, man will voluntarily integrate his own goals with those of

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[1]Abraham H. Maslow, Motivation and Personality, trans. by Hersey and Blanchard, Management of Organizational Behavior, pp. 17-20.

the organization.[1]

Frederick Herzberg directed a series of studies to collect data on job attitudes from which assumptions about human behavior could be made. Out of these studies Herzberg developed a theory which has contributed to the self-motivation approach. His theory maintains that an individual's needs are divided into two categories, hygiene factors and motivators. He found that the two categories affect behavior in different ways. The hygiene factors produced feelings of satisfaction when they were fulfilled, but they did not motivate an individual. However, if these needs were not met they resulted in feelings of dissatisfaction and negatively affected performance. The hygiene factors are related to the conditions under which a job is performed, and include such factors as company policies and administration, supervision, working conditions, interpersonal relations, money, security, and status. On the other hand, Herzberg found that an individual's needs for achievement, recognition, challenging work, responsibility, and growth and development were genuine motivators.[2]

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[1]Schein, Organizational Psychology, p. 56.

[2]F. Herzberg, B. Mausner and Barbara Snyderman, The Motivation to Work, trans. by Hersey and Blanchard, Management of Organizational Behavior, pp. 46-47.

The implication to management of this theory is that they must provide for peoples' hygiene needs to prevent dissatisfaction, but they should not expect to motivate people by meeting these needs. In order to motivate people management must provide an opportunity for them to satisfy the motivators.

Douglas McGregor appears to support this approach to motivation in his Theory Y. He states that man can be basically self-directed and creative in the work situation, if management creates conditions such that the members of the organization can achieve their own goals best by directing their efforts toward the organizational goals.[1] McGregor maintains for the lower level needs this can be done by management equitably providing extrinsic rewards and punishments for positive and negative contributions, respectively. Also, with respect to man's higher level needs, management must provide an environment that will permit and encourage employees to seek intrinsic rewards in the work situation.[2]

The contributions of Chris Argyris to this approach to the problem of motivation have also been significant. Argyris' findings, which came from studies of industrial organizations

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[1]McGregor, The Human Side of Enterprise, p. 49.

[2]McGregor, The Professional Manager, p. 15.

to determine the effects of various managerial practices on behavior and growth of individuals, were critical of management practices that tend to restrict individuals from attaining maturity. He refers to this as a lack of congruency between the needs of healthy individuals and the demands of the formal organization. In regard to maturity Argyris stated:

> To the extent that individuals who are hired to become agents of organizations are predisposed toward maturity, they will want to express needs or predispositions related to the adult end of each specific developmental continuum. Theoretically, this means that healthy adults will tend to obtain optimum personality expression while at work if they are provided with jobs which permit them to be more active than passive; more independent than dependent; to have longer rather than shorter time perspectives; to occupy higher positions than their peers; to have control over their world; and to express many of their deeper, more important abilities. These developmental trends may be considered as basic properties of the human personality. They are the "givens" that an administrator accepts the moment he decides to accept human beings as agents of the organization.[1]

Argyris maintains that actions of increasing the degree of management controls, directive leadership, and the number of pseudo-human relations programs tend to increase the degree of incongruency between the individual and formal organization. While job enlargement and employee-centered leadership are ways

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[1]Chris Argyris, Personality and Organization (New York: Harper & Brothers, 1957), p. 53.

to decrease the degree of incongruency.[1]

In summary, the self-motivation approach emphasizes the importance of management providing an environment that is conducive to employees being able to satisfy their higher-level needs. It assumes that this will result in employees who will be motivated toward accomplishing organizational goals. Also, it does not ignore man's lower-level needs in that it presumes they must be satisfied by extrinsic rewards before individuals can direct their energies toward achieving autonomy, challenge, and self-actualization.

As previously indicated, this approach is relatively new and untried in business and government. Therefore, there is little empirical knowledge of the effectiveness of this approach to motivation. Also, most of the studies which led to this approach were confined to managers and professionals in organizations. It remains to be determined by actual practice whether or not this approach will be successful throughout organizations. Even if this approach does not result in a solution to the problem of motivation, it may lead to further research and study which will increase man's knowledge of human behavior in the work environment.

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[1] Ibid., pp. 236-237.

Summary and Conclusions

This chapter has defined motivation, discussed its importance, and has surveyed some of the more significant approaches to the problem of motivation. Which of these approaches is the correct one? The answer to this question, in my opinion, is none of them; rather it is probably a combination of all these approaches as well as others not known at the present time. Motivation is complex because it deals with complex things, i.e., the needs, past experiences, capabilities, and backgrounds of men. Each of these factors vary in different men, and may vary in the same man from time to time and from situation to situation. Ray C. Hackman recently stated, "With respect to prevailing concepts, however, the findings clearly indicate that a multi-dimensional concept is necessary to comprehend the work motivation of men and women."[1]

It would appear that each of the various approaches to motivation have erred by oversimplifying and overgeneralizing. Each one would appear to motivate most people some of the time, and some people all of the time. The behavioral scientists have made significant contributions to management in the field

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[1]Ray C. Hackman, The Motivated Working Adult (American Management Association, 1969), p. 15.

of organizational behavior. However, a word of caution given by Philip B. Applewhite should be noted:

> Organizational behavior has as its goal the establishment of principles that explain and predict behavior statistically. Because man does have free will he can always decide not to conform to whatever laws or principles behavioral scientists come up with. Because of this free will, behavioral scientists can only predict what most people will tend to do given a certain situation; they cannot predict what any given person will do.[1]

Based upon these observations about man and motivation in the work environment, perhaps the best approach for management to follow is one where the managers at all levels of the organization:

1. Appreciate the differences in the abilities and the needs of man. This requires a basic understanding of human behavior.

2. Develop an ability to recognize these differences. In addition to understanding human behavior, this requires experience in dealing with people.

3. Keep abreast of current research and findings in the field of motivation and human behavior. In spite of the gains which have been made, there is still much to be discovered about the determinants of motivation of people at work.

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[1]Philip B. Applewhite, Organizational Behavior (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 2.

4. Adapt the motivational process to the existential situation. Since an all inclusive approach to motivation has not been developed, the various approaches must be tested by a manager to determine which are the most effective and efficient in his organization. Further, it requires continuous testing of new ideas and information as our knowledge of motivation increases.

5. Continuously review the motivational process in use to insure it is productive and competitive. It must be productive in the sense of inducing people to work efficiently and effectively. It must be competitive in that the costs of the process cannot exceed its benefits.

6. Maintain a sense of balance between satisfying employee's needs and achieving organizational goals. This requires attention to the needs of employees in the hope that both organizational goals and employee goals can be satisfied. However, should the two come into conflict the organizational goals must be satisfied.

This approach offers nothing new regarding motivation and human behavior. It is merely a logical approach, in my opinion, based upon current knowledge of a complex problem.

CHAPTER III

ZERO DEFECTS PROGRAM ANALYSIS

The Nature of Defects

Everyone is aware of the problem of defects in the goods and services which we obtain in our daily purchases. We buy houses, automobiles, televisions, tires, appliances, food, and a wide range of services all of which are subject to having defects. Also, defects are not limited to the lower priced items of a particular product line, as evidenced by a recent article in the Wall Street Journal. The article reported numerous complaints were being made to U. S. Agencies and corporation critic, Ralph Nader, concerning the defects in Cadillacs, Imperials, and Lincolns.[1] Some of the defects we encounter are just an annoyance, while others could result in injury or even death.

Industry is not unaware of this problem as they have continuously searched for ways to reduce defects. They have

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[1]"Luxury-Car Owners Say Lemons Can Come in All Price Ranges", Wall Street Journal, Feb. 10, 1970, p. 1.

introduced quality control programs so as to enable production and service at the most economical levels which allow for full customer satisfaction. Although there are no statistics available on the amount spent by industry for quality control, A. V. Feigenbaum has estimated from surveys of quality costs in American industry that they may run as much as fifty to sixty billion dollars a year. Feigenbaum divides quality costs into three categories: (1) prevention costs, which keep defects from occurring in the first place, (2) appraisal costs, which provide formal evaluation of product quality, and (3) failure costs, which are the result of defective materials and products that do not meet company quality specifications. He estimates that approximately 70 per cent of every quality cost dollar is spent for failure costs, 25 per cent for appraisal costs, and only 5 per cent for prevention costs. In analyzing this breakdown, Feigenbaum states:

> In a nutshell, this cost analysis suggests that we have been spending our quality dollars the wrong way: a fortune down the drain because of product failures; another large sum to support a sort-the-bad-from-the-good appraisal screen to try to keep too many bad products from going to customers; comparatively nothing for the true defect-prevention technology that can do something about reversing the vicious upward cycle of higher quality costs and less reliable product quality.[1]

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[1]A. V. Feigenbaum, Total Quality Control (New York: McGraw-Hill Book Company, 1961), pp. 83-84.

Of the fifty to sixty billion dollars spent on quality costs, Feigenbaum believes that at least twelve to fifteen billion dollars a year could be saved by substituting prevention costs for failure costs. If this amount of savings could be achieved, the implications are great. Not only could industry reduce their cost and thereby increase profits, but the consumer would benefit by receiving less defective goods and services.

In order to reduce defects by preventing them, it is necessary to determine the causes of defects. The factors that affect quality may be divided into two major groupings: (1) the technological, which are the machines, materials, and processes, and (2) the human, which are the people in the organization. The human factor is by far the most important because people can control, at least to some extent, the technological factor. The responsibility for quality control permeates the entire organization. This permeation can be best shown by the following breakdown of personnel in the organization:

1. Management is responsible for setting the requirement for quality in the organization and communicating the need for quality throughout the organization. This includes

complete support of the quality control program.

2. The quality-control organizational component is responsible for two objectives: (1) to provide quality assurance for the company's product, and (2) to assist in assuring optimum quality costs for these products. It fulfills these two basic responsibilities through three subfunctions:

a) Quality-control engineering does the quality planning which establishes the basic framework of the entire quality-control system for the company.
b) Process-control engineering (including also inspection and testing) monitors the application of this quality-control system on the shop floor.
c) Quality information equipment engineering designs and develops the inspection and testing equipment for obtaining these process control measurements.[1]

3. Each individual employee of the organization is responsible for the quality of his own work. Even though an employee's work is not directly related to the production of the company's product or service, defects in all areas affect the organization's effectiveness and efficiency.

Philosophy of Zero Defects

People's views regarding mistakes are a dichotomy.

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[1] Ibid., p. 50.

When the mistake is his own, he justifies it by saying that everyone makes errors. He applies this reasoning to his mistakes made in chores, studies, recreation, and work. It appears people are concerned with just getting by rather than seeking perfection. They are satisfied to obtain passing grades in school and to meet acceptable quality levels in their work. However, when the mistake is that of someone providing a product or service to him, he expects a high degree of perfection. He does not excuse this type of mistake by saying everyone makes errors. He does not shrug off the mistake when his new car has a window that will not function properly or when the dry cleaner presses his pants with the crease on the side rather than the front.

The problem management faces is that of motivating people to strive for the same perfection in their work which they demand of those who furnish them with goods and services. A technique that has been used successfully by both government and industry to help solve this problem is Zero Defects. Zero Defects is a management tool which is aimed at the reduction of defects through prevention. It is directed at motivating people to prevent mistakes by developing a constant, conscious

desire to do their job right the first time. As stated by James F. Halpin, "The key to this definition is the word people. To be successful the program must center on the individual, for over the long haul, the quantity of errors each of us makes is directly proportional to the importance each of us places on the function of the moment."[1] Halpin maintains the attainability of this goal is directly proportional to the attitude of the individual. Further, this attitude will result from action by management to make the individual aware that: (1) his task is important, (2) the product he is working on is important, and (3) management thinks his efforts are important.[2]

The Zero Defects philosophy is a positive one. It does not question the integrity of the individual, nor does it imply a threat to him, if a certain action is not attained. Rather, the individual is presumed to have a desire to do good work when he knows what is expected of him and when he is presented with a challenge. Management sets the standards of performance and advises the individual how his performance compares with the standards. Management takes positive action to recognize individuals who meet these standards.

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[1]Halpin, Zero Defects, p. vii. [2]Ibid., pp. 5-6.

The application of a Zero Defects program encompasses the entire organization. It is directed at each and every employee in the organization from the president to the janitor. It challenges all employees to do their work right the first time and to take part in the elimination of errors by submitting their ideas whether they be employee or situationally caused. Thus, Zero Defects provides the means for influencing the two major factors that affect quality, i.e., technological and human.

The purpose of Zero Defects is not to create the infallible person, but to reduce fallibility. Likewise, it is not designed to replace the quality control program, but to supplement it by providing another management tool for preventing errors.

Techniques of Zero Defects

James F. Halpin's book gives the step-by-step procedures for implementing a Zero Defects program.[1] However, no purpose would be served in this paper by discussing the procedures for implementing the program. The purpose of this section is to discuss the what and why, not the how, of Zero Defects programs.

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[1] Ibid., pp. 23-186.

The primary requirement of Zero Defects is management's full and active support of the program. This requires management to be convinced of the merits and the feasibility of the program. Also, this support must not subside as time passes because employees will quickly recognize any signs on the part of management which shows a lack of interest. If this happens, the employees will feel it is just another shallow disguise by management to manipulate them, and they will soon forget the program entirely.

Management demonstrates their support by implementing, backing and participating in the various techniques of Zero Defects programs.

Zero Defects Administration

Although there is no one place in the organization where the responsibility for administration of the Zero Defects program should be located, it is most frequently placed in the quality department. However, it is important that the responsibility not be pushed so far down in the organization that employees interpret the location as the importance that management is placing on the function. Halpin points out that the

more direct the line of communications between the person responsible for Zero Defects administration and the senior executive the more effective the program will be.[1]

The overall administration of the program will be assigned to the Zero Defects Administrator. He is the representative of management who is responsible for planning and coordinating the company's Zero Defects program. He should be carefully selected, because his duties will require him to work with people at all levels of the organization. Halpin suggests the criteria for selection should include the following:

1. He must believe in the program philosophy.
2. He must feel that the program goals are attainable.
3. He must have the respect of management and worker alike or be able to command such respect once he is appointed.
4. He must have a thorough knowledge of the organization, its politics, and its people.
5. He must have the intestinal fortitude, or guts if you will, to drive toward these goals regardless of any roadblocks set before him.[2]

The size of the Zero Defects organization will depend upon the size of the company. If the company is small, then the Zero Defects Administrator may be a one-man staff. However, in larger companies the administrator may be assigned temporary

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[1] Ibid., p. 27. [2] Ibid.

help to get the program initiated, and part-time divisional and departmental Zero Defects representatives to assist him after the program is started. These representatives perform a liaison function between the administrator and the department or division. The Allison Division of General Motors has appointed an administrative council composed of employees reporting to the general manager's staff members. Each member is responsible for implementing the Zero Defects program in his respective area and relying on the Zero Defects Administrator for problems of division recognition, publicity, and sustaining effort.[1]

Union Involvement

It is important for management to inform and get the approval of any unions which represent its employees before implementing a Zero Defects program. Union participation in the program greatly facilitates obtaining employee support. The unions have generally supported implementation of Zero Defects. Wise W. Stone, the assistant director of the United Auto Workers, expressed the reasons for union support when he stated:

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[1]C. R. Perry, "Zero Defects is a Motivational Tool", Systems & Procedures Journal, Vol. 18, No. 2, (March-April, 1967), p. 20.

> It is always a pleasant experience for labor to participate jointly with management in a program which emphasizes the dignity and appreciation of individual accomplishment. This, in our way of thinking, is the primary strength of this Zero Defects program. Accomplishments by individuals joined collectively in an environment for improvement are, and must always be, the goal of organized labor. There is no company in industry that can succeed without the talents of its workers from the top executive to the least skilled. Nor is there any company in industry that can succeed without a true appreciation of individual needs for job security and recognition of accomplishments.[1]

If the union officials concur with Zero Defects, they should be asked to indicate their approval to the union stewards and to indoctrinate them.

Supplier Involvement

The idea of presenting the Zero Defects concept to the suppliers of an organization that is implementing or that has implemented a Zero Defects program is obvious. It is difficult to ask your own employees for defect-free work when the materials they are working with and which are provided by your suppliers are defective. In such cases no amount of effort can produce a product or service without defects.

The supplier Zero Defects program should be based upon the size and the number of suppliers that the implementing

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[1]Halpin, Zero Defects, pp. 34-35.

organization has providing it with material. Some recommended methods of exposing suppliers to the Zero Defects concept are:

1. Individual presentations by management of the implementing organization may be appropriate when there are only a few suppliers.

2. Supplier seminars may be required if there are many suppliers concerned with supplying materials to the implementing organization.

3. Administrator workshops to assist suppliers that may be too small to have the ways or means of implementing a Zero Defects program on their own.[1]

When an organization has suppliers who also have Zero Defects programs, annual workshops may be considered. The advantage of such annual meetings is to provide all those involved the opportunity to share in new techniques and problems.

Product and Quality Awareness

Another technique that is used in Zero Defects programs is that of emphasizing to all employees the important relationship of their tasks to the end product or service produced by

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[1]Ibid., pp. 65-70.

the company. The purpose of this step is to ensure each individual in the organization understands the reason for his existence in the organization and the importance of his contribution to the organizational goals. It is also beneficial in helping the individual to develop a sense of pride in his performance.

Several methods that have been used successfully in accomplishing product and quality awareness are:

1. Use of the company newspaper or bulletin board for such news as new contracts, new products, key deliveries, development breakthroughs, and customer information.

2. Use of employee-supervisor meetings to make individual employees aware of their tasks in relation to the final product or service. Also, these meetings can be effectively utilized to have representatives of other departments in the organization speak to the workers regarding the effects of their work on the work of the representative's department.

3. Have the company's customers speak to the employees regarding the importance that he attaches to receiving defect-free products.

4. Use of product displays and demonstrations to give

the employees a chance to see how their task fits into the whole product picture.[1]

Error Cause Removal

As it was previously mentioned, the human factor is by far the most important of the two major factors that affect quality. This is because people can control, to some extent, the technological factor which consists of the machines, materials, and processes. The Error Cause Removal technique of Zero Defects programs provides a means for attacking errors that are attributable to machines, materials, processes, or any other source. It is a way for management to demonstrate to all employees that they are serious about eliminating the cause of defects regardless of the source.

The General Electric Company developed the Error Cause Removal as part of its Zero Defects program to provide each employee with a tool for identifying real or potential causes of error. The procedure is as follows:

1. All workers are provided with a form with which to identify any existing or potential causes of error. They do not have to suggest corrective action but they are welcome to do so.
2. The form is turned into the supervisor who takes

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[1]Ibid., pp. 80-83.

immediate action to correct the situation if at all possible. Experience has shown that the supervisor can provide the solution in 90 per cent of the cases.

3. If the supervisor can't handle the problem within his own department, the ZD Administrator or representative takes on the task of bringing together the elements within the plant that can straighten out the situation.
4. Every effort is made to get a reply to the employee in the shortest possible time. You never want to give him cause to think that by submitting a form he is really dropping it into a bottomless pit of red tape.
5. If, after serious consideration, the supervisor finds that the error cause is imagined or for some reason can't be corrected at that time, he carefully explains why to the worker.
6. Regardless of the outcome, the worker realizes that management has given his Error Cause Identification serious consideration and has taken the time to make sure that any possible cause of error is checked out thoroughly.[1]

In addition to the advantage of locating causes of errors, the Error Cause Removal technique improves communications between management and the employees. Once the employees see that management will carefully consider their ideas for reducing the cause of errors, they will develop a greater sense of pride in their work. Melvin Laird, the Secretary of Defense, emphasized this feature in a statement on the Zero Defects program in the Navy's Zero Defects Newsletter.

These programs give all of us an opportunity to make

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[1] Ibid., pp. 59-60.

> our voices heard--in a calm, orderly and intelligible way. Specifically the "Error Cause Removal" feature of Zero Defects makes possible direct communication among concerned persons regarding the root cause of failures, defects and misunderstandings. This is the kind of quiet but effective communication that President Nixon encouraged in his Inaugural Address.[1]

Program Kickoff

Zero Defects programs usually start with a combination of an organization-wide rally and departmental meetings. The organization-wide rally serves the purpose of generating employee interest in the program by showing top-management endorsement and support. The departmental meetings are used to provide a more personal and detailed description of Zero Defects, and to answer employee questions relating to the program.[2]

The organization-wide rally includes guests of industry, Government, union, and community. The program commences with an address by the Senior Executive who discusses the importance of individual achievement to the company, the product, the

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[1]U. S. Department of the Navy, Naval Material Command, Call Sign: ZD, NAVMAT P-4800, April, 1969, p. 3.

[2]U. S. Department of Defense, Office of the Assistant Secretary (Installations and Logistics), Zero Defects: The Quest for Quality and Reliability Assurance, Technical Report Number 9, 15 August 1968, p. 184.

customer, the the employees themselves. The Zero Defects Administrator discusses the key points of the program and offers the Zero Defects challenge to management and the employees. Also, industry and union leaders speak to endorse the program. Finally, a representative from the Federal Government speaks to discuss the value of Zero Defects to the nation.

In the departmental meetings the employees are given the opportunity to sign pledge cards, if they are willing to accept the challenge of Zero Defects and commit themselves to the program. Zero Defects pins are presented to those who sign the pledge. Also, numerous other promotional and administrative tools are used to support the kickoff and the various activities surrounding the day (e.g., posters, banners, stickers, paycheck inserts, special luncheons, prizes, and newspaper and radio publicity.[1]

The kickoff is impressive and it serves a good purpose in implementing a Zero Defects program, but management must be careful not to believe that their responsibilities end here. The relationship between the initial activities and the other elements of the Zero Defects program was put into the proper

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[1]Halpin, Zero Defects, pp. 93-101.

perspective by C. R. Perry, when he stated, "A Zero Defects program should start off with some fanfare; but what is done after the fanfare to keep the idea going and the results coming is what counts."[1]

The kickoff program is intended to accomplish the following:

1. All employees know and understand the challenge of Zero Defects.
2. Each employee understands his own role in the program.
3. The fact that management is 100 per cent behind the program is made obvious.
4. Every employee understands the pledge he is making.
5. Management recognizes the individual for accepting the challenge.
6. Management recognizes the supervisor for his support.
7. The worker understands the program scope and the extent of sign-up.
8. All influencing elements (union, press, community leaders) understand and back the program.
9. All management becomes actively and personnally involved in the program.
10. Each employee is given the opportunity to join the team, but none is ever coerced by management into accepting Zero Defects.[2]

Performance Measurement

Employee performance is measured under Zero Defects to provide a basis for recognition of employees who make

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[1]Perry, "Zero Defects", p. 18.

[2]Halpin, Zero Defects, pp. 112-113.

significant contributions to the program. Although the data collected to satisfy the requirement of recognition may also be used to take corrective action (e.g., problem-area highlighting and group-accomplishment awareness), it is important that the latter use not be connected with the Zero Defects program. The importance of this requirement is emphasized in a statement of Wise W. Stone:

> The basic philosophy as expressed by industry management, that management does not harass employees or use Zero Defects as a club, is vitally important. I have been assured by many local executives of the unions at the Martin Company, Hayes International, North American Aviation, and many other companies having Zero Defects programs that one of the primary reasons for the success of the program in their plants is based on the concept of rewarding employees through public recognition of superior accomplishments and not harassing them for their mistakes. This is the positive as opposed to the negative approach.[1]

This does not mean that management should not reprimand employees when it is justified, but that Zero Defects should not be used as the reprimand "club".

Another important point regarding performance measurement is that management must carefully select the items which are to be measured to ensure they reflect the significant portions of each job and that they are considered to be fair

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[1] Ibid., p. 35.

measurements. Each individual must be made aware of the criteria and the goals set in order for him to attempt to meet them. Furthermore, since Zero Defects is never meant to punish or embarrass individuals, the status of individual achievement is never posted.

Many organizations that have implemented Zero Defects programs utilize individual-measurement data to compile group-measurement statistics. These statistics are posted and are frequently used to encourage competition among the various groups. Winners of the competition are presented with a trophy which is held by the group until a new winner is announced. However, individuals should not be recognized on the basis of group performance because membership in a high-achievement group does not necessarily mean that the individual is a high achiever.[1]

James Halpin has identified various elements of production, clerical and administrative, and scientific/professional jobs which can be used to judge performance.[2] It is not within the scope of this paper to elaborate on these elements other than to suggest that there are means to evaluate a person's contributions to error-free performance regardless of the job

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[1] Ibid., pp. 119-120. [2] Ibid., pp. 117-155.

he performs in the organization.

Employee Recognition

Recognition is an integral part of Zero Defects programs. It is the means by which management show the employees that they are aware and that they care about outstanding performance. As it was mentioned in the previous section, recognition is the only reason for performance measurement in Zero Defects. If the recognition is meaningful and related to the accomplished task, it serves as a powerful motivating factor. However, if management recognizes achievements of individuals that are not deserved, the tendency will be for employees to believe that management is not really serious about outstanding performance at all.

Recognition in the form of monetary and other material rewards are not consistent with the Zero Defects philosophy. In this regard, James Halpin has stated:

> Perhaps the most surprising thing about ZD recognition is that it need not involve a monetary outlay. If we are to follow the ZD philosophy, it can't. Management hired an employee to do a job and to do it right. It would not make sense to give him a bonus simply for doing what he was hired to do. Such an act would say that, when it hired him, management really didn't expect the worker to do good work. Thus, the man

> is being paid for mediocre effort. Since employees are keenly aware of management attitude, it is basic to the program that ZD recognition take another approach--one where management openly and honestly demonstrates that his effort is recognized and appreciated by the organization. To put it in its fundamental state, it is simply management telling the employee it is aware of his achievement. This act is accomplished by face-to-face contact between employee and management.[1]

Experience has shown that the strongest long-and-short-term payoff of the Zero Defects program is personal recognition. Some techniques that have been used with success in industry and government are: (1) lunch with top plant executives, (2) feature articles on leading achievers in the company newspaper, (3) letters of commendation sent to the individual's home, (4) special field trips for groups or individuals so they can see their product in actual use, and (5) pins, plaques, and trophies as tangible reminders of individual recognition.[2]

The selection of individuals for recognition begins with the first-line supervisor completing an achievement form. The form provides space for the supervisor to show the achievement and supporting information. The following checklist has been developed for evaluating Zero Defects achievers to ensure sufficient information is provided on the achievement form:

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[1] Ibid., pp. 160-161.

[2] Technical Report Number 9, Zero Defects, p. 166.

1. Impact of potential error (abort of mission, cost, effect on schedules, etc.).
2. Contribution of the individual or group to the prevention of error.
3. Difficulty of the job and level of skill required.
4. Level of tediousness or boredom of assigned task.
5. Schedule and load impact on error potential.
6. Ability of employee to correct his own errors before being detected by a checker.
7. Attitude of the worker toward work, project and company mission.[1]

This information is essential since the next step in the procedure is for a review committee to approve or disapprove the supervisor's recommendation for recognition. The committee consists of the ZD Administrator, representatives of employee relations or personnel, and a member of each major function within the organization.[2] Once the committee approves the achievement, the Zero Defects Administrator arranges for the recognition of the employee. It is important that management take an active role in this phase of the program in order to reflect continued management interest and support of Zero Defects.

Sustaining Zero Defects

The last, but certainly not the least important, of the techniques of Zero Defects programs is that of ensuring ZD will

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[1]Halpin, Zero Defects, p. 163. [2]Ibid., p. 185.

be sustained and retain its viability. If management does not seriously consider all the ramifications of the program and does not carefully plan for each of these, Zero Defects will be of limited success or possibly fail altogether.

In the area of sustaining the program, this requires an awareness by management and the ZD Administrator that an oversaturation of the promotion and publicity given to Zero Defects can result in all members of the organization becoming immune to it. James Halpin suggests Zero Defects should be tied to recognition activities and special events, and that four to six impact weeks should be scheduled throughout the year.[1] It also requires the Zero Defects Administrator to use his imagination to determine new ways to keep the philosophy of defect-free work alive throughout the organization. The annual workshops, which were previously discussed, provide a means for the Administrator to learn ways other companies have used to promote Zero Defects.

In the final analysis, sustaining a Zero Defects program is dependent upon the active participation of the individual members of the organization. This, in turn, is determined to a large extent by active and complete management

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[1] Ibid., p. 187.

support of the Zero Defects program.

Summary and Conclusions

Zero Defects is concerned with creating in each individual of an organization the same attitude toward defects in his work as he has in most of the activities of his personal life. It assumes people want to do good work and that they will if management meets its responsibilities for providing a proper environment which is conducive for this purpose. The management responsibilities in this regard are as follows:

1. Ensuring each employee is made aware of the importance of defect-free goods and services.

2. Stressing the importance of each individual's job to the end product of the organization.

3. Providing each employee with a goal which reflects the standards of quality they are expected to achieve in their work.

4. Providing a means of communications for employees to identify any existing or potential cause of error.

5. Informing each employee how his performance compares with the goal.

6. Providing a proper form of recognition for all outstanding performance by individuals.

The purpose of Zero Defects programs is to reduce defects through prevention. To the extent Zero Defects is successful, it will benefit: (1) the individual employee by increasing his sense of pride, (2) the organization by increasing its effectiveness and efficiency, (3) the customers by reducing the number of defective goods and services they receive, and (4) the economy by reducing the waste of resources.

The success of a Zero Defects program is contingent on sustained management interest, support, and direction. It requires management to gain a thorough understanding of the various techniques used in the program, and to adapt Zero Defects to the needs of their own particular organization. Finally, the program is not a substitute for good management. An organization should not expect to solve all its quality problems by implementing a Zero Defects program. It attempts to achieve perfection, not perfectionism.

CHAPTER IV

ZERO DEFECTS AND MOTIVATION

Comparison of Zero Defects With Various Approaches to Motivation

Motivation in the work situation and the Zero Defects program were discussed in Chapters II and III, respectively, and provide a framework for this section. In this section, the Zero Defects concept will be compared with the more significant approaches to motivation which were surveyed in Chapter II. The purpose of this comparison is to determine if Zero Defects is compatible with one or more of the various approaches, i.e., economic, hygenic, social, and self-motivation.

Zero Defects and the Economic Approach

As previously indicated, the basic assumption of the economic approach to motivation is that money and motivation are synonymous. Under this approach management motivates people by granting or withholding monetary rewards for their

contributions to the organization. In contrast, a Zero Defects program places emphasis upon intrinsic incentives, i.e., rewarding an individual's achievements by means of recognition. The method of recognition takes many different forms, but each is directed toward increasing the individual's esteem, both his self-esteem and recognition from others. It does not disregard the importance of monetary considerations in satisfying an individual's needs. Rather, the Zero Defects philosophy presumes that management will provide for employees' economic needs by paying them a fair and just wage in the basic employment contract.

Zero Defects programs are not in consonance with the assumption of the economic approach that people have an inherent dislike of work and will avoid it if they can. Managers who subscribe to this assumption about man feel they must coerce, control, direct and threaten their employees with punishment to get them to work toward achieving organizational goals. Zero Defects assumes people want to work and that they will be concerned with the quality of their work providing management clearly states their requirements and provides a challenge for them. Also, Zero Defects does not imply a threat of punishment

if certain action is not accomplished. It does not contend that disciplinary action is never required, only that it should not be used as a threat in management's attempt to motivate employees.

As it was pointed out in Chapter II, the foundation of the economic approach is Frederick Taylor's concept of scientific management.[1] Since his concept is primarily concerned with increasing production, it is difficult to compare with Zero Defects because ZD is interested in the quality of employees' work in lieu of the quantity they produce. Despite the difficulty of a direct comparison, it can be surmised that scientific management's emphasis on the control of workers is not in conformity with the philosophy of Zero Defects programs. This conflict is in the degree of control rather than whether control is required for effective management. Therefore, many of Taylor's mechanisms of management may be appropriate for use in the control process.

In view of the dissonant assumptions about the nature of man and what motivates him, it is concluded that Zero Defects and the economic approach to motivation are not strictly compatible.

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[1]Taylor, Principles of Scientific Management, trans. by George, The History of Management Thought, p. 90.

Zero Defects and the Hygenic Approach

The hygenic approach to motivation is concerned with satisfying employees through wages, benefits, pensions, working conditions, and supervision. It assumes that management can motivate individuals by satisfying their physiological and security needs. Conversely, Zero Defects is directed toward satisfying individual's needs for esteem and self-actualization. The hygenic approach attempts to motivate workers through benefits that are shared equally by all employees. This is in contrast with the Zero Defects philosophy which stresses the importance of the individual in the motivational process.

It is concluded that the hygenic approach to motivation is not compatible with Zero Defects because of basic differences in the kind of individual needs each maintains must be satisfied to motivate.

Zero Defects and the Social Approach

The social approach to motivation emphasizes man's need for acceptance, identity, and sense of belonging. It maintains these social needs are paramount in the motivational process, and that they can best be obtained by employees through

informal worker groups. In contrast, the Zero Defects approach to motivation stresses the following: (1) the importance of each individual to the organization, (2) the importance of each job in the attainment of the organizational goals, and (3) a sense of pride in craftsmanship. This represents an attempt by management to put the meaning back in work, which Elton Mayo maintained had been taken out as a result of the industrial revolution and the rationalization of work.

Although the Zero Defects program is not specifically directed at informal work groups, the importance of these groups cannot be ignored by management when instituting a ZD program. The success of Zero Defects in motivating individuals appears to depend upon its ability to provide workers with a sense of identity and belonging on the job. If this can be accomplished, the group standards will include the requirement for group members to be committed to perfection in their work.

As it was pointed out in the discussion of Zero Defects programs, management must provide an environment that is conducive for employees to do good work. The management responsibilities in this area are such that individual managers must be attuned to the needs of his employees. Therefore, the type of

supervisor required in Zero Defects programs is the employee-centered supervisor who was identified as being more effective than job-centered supervisors by Rensis Likert.[1]

Notwithstanding the similarity in the requirement for the same type of manager, Zero Defects and the social approach to motivation are not compatible. Zero Defects philosophy is that individuals can be motivated by work itself rather than exclusively by social relationships on the job.

Zero Defects and the Self-Motivation Approach

The basis of motivation in the self-motivation approach shifts from extrinsic to intrinsic rewards. The management responsibility in this approach is one of providing an opportunity for employee's existing motivation to be directed toward organizational goals. This is the approach suggested by Zero Defects in its aim to reduce defects through prevention. Management seeks to provide an opportunity for employees throughout the organization to direct their existing motivation toward the organizational goal of improved quality. Both Zero Defects and the self-motivation approach emphasize the importance of management building a feeling of mutual contribution

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[1]Likert, New Patterns of Management, p. 7.

by all members of the organization. This is accomplished in the Zero Defects program by management continuously showing an interest in the individual, his job, and his accomplishments.

Zero Defects seeks to instill in each individual a sense of pride in his attitude, achievements, and in self. Thus, it motivates by attempting to satisfy employees' higher level needs of esteem and self-actualization as defined by Maslow in his hierarchy of needs.[1] Management sets the standards for quality performance, and asks each individual to strive for error-free work in his particular job. Further, employees are encouraged to use a certain amount of autonomy and independence by recognizing and calling to management's attention any real or potential source of errors. Finally, Zero Defects provides for intrinsic rewards, i.e., recognition, for those who contribute significantly to the prevention of errors. Zero Defects, therefore, provides for several of an individual's needs which were found to be genuine motivators in the studies of Herzberg, et al.[2] These needs are: (1) achievement, (2) recognition, (3) challenging work, and (4)

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[1]Maslow, Motivation and Personality, trans. by Hersey and Blanchard, Management of Organizational Behavior, pp. 17-20.

[2]Herzberg, Mausner, and Snyderman, The Motivation to Work, pp. 46-47.

responsibility. However, Zero Defects does not provide for an individual's physiological needs, i.e., the basic human needs required to sustain life itself. It does not provide directly for security and affiliation needs, but it can provide an atmosphere that is conducive for an individual to obtain these needs.

As previously mentioned, Chris Argyris' findings, which resulted from his studies of industrial organizations, have contributed to self-motivation approach.[1] The synthesis of Argyris' findings is that in modern industrial organizations there is a lack of congruency between the needs of individuals and the demands of the organization. The Error Cause Removal technique used in Zero Defects programs provides a means for employees to: (1) be more active in their work, (2) be more independent in their work, (3) exert more control over factors which affect their work, and (4) use more of their abilities in the work situation. These are a few of the actions that Argyris maintains management can take to reduce the degree of incongruency.

Zero Defects programs do not provide for all the factors in the self-motivation approach. Also, each technique

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[1]Argyris, Personality and Organization, p. 53.

of a Zero Defects program will not in itself assure full coverage of each factor in this approach. However, Zero Defects does suggest a logical approach that is consistent with the self-motivation approach. It is, therefore, concluded that Zero Defects is compatible with this approach to motivation.

Zero Defects Program Results

In the final analysis, the effectiveness of a motivational program, such as Zero Defects, should be measured by comparing the costs with the benefits derived. Unfortunately, the effectiveness of a motivational program cannot be completely measured in economic terms. The costs of the program can be determined fairly accurately and without much of a problem. However, the benefits derived from the program fall into two categories: (1) those which can be measured quantitatively, and (2) those which do not lend themselves to quantitative measurement.

Although the first category of benefits should be measured quantitatively and compared with the costs incurred in deriving the benefits, the second category should not be

ignored by management in determining the effectiveness of a motivational program. In this regard, Rensis Likert has cautioned management against relying only on the level of performance of the end-result variables (e.g., production, sales, costs, and earnings) in evaluating the results of various management techniques.[1] He maintains this has resulted in management arriving at faulty conclusions as to what kinds of management and leadership yield the best results. Likert asserts the evaluation must include the measurement of variables that reflect the condition of the internal state of the organization. These variables include: (1) loyalty, (2) skills, (3) motivations, and (4) capacity for effective interaction, communication, and decision-making. He defines these as the intervening variables, and states they can be measured even though they are not measurable in economic terms. However, he warns that the measurement, analyses, and the interpretation of these variables is a complex process which cannot be done by an untrained person, but requires the help of a social scientist with extensive training in this area.[2]

It is not within the purview of this paper to analyze

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[1]Likert, New Patterns of Management, p. 61.

[2]Ibid., pp. 195-196.

the effectiveness of Zero Defects programs in economic terms. The effectiveness will, of course, vary from organization to organization since the costs incurred and benefits derived will vary. Also, there are no published figures on the comprehensive costs of Zero Defects programs. However, the purpose of this section is to review some of the results obtained by organizations utilizing the Zero Defects concept. These results will be confined to measurable benefits of Zero Defects that have been reported in various articles and books, and the findings of three studies conducted to determine employee opinion of ZD programs. Two of the studies that are reviewed were conducted in private industry and one was conducted in the Department of Defense.

Measurable Results of Zero Defects

As it was indicated in the Introduction of this paper, the success of Zero Defects at the Martin Company, which initiated the first ZD program, prompted other organizations in industry and government to implement these programs. Zero Defects could not have ever gained such popularity without a number of successes. The following are representative of the

successes which have been reported in various publications:

1. Martin Company reported a 54 per cent decrease in defects and a 1.65 million dollar savings in manufactured hardware in the first two years of the Zero Defects program.[1]

2. Westinghouse Defense and Space Center using a ZD type of program reported a savings of $192,000 in only six months.[2]

3. North American Aviation's Autonetics division reported an 88 per cent decrease in Class A defects, a 92 per cent decrease in Class B defects, and an 8 per cent decrease in Class C defects in the first year of their ZD type program.[3]

4. Lockheed reported decreases of 41 per cent in design errors, 54 per cent in documentation errors for accounts payable, and 47 per cent in shipping and receiving.[4]

5. Naval Supply Center, Charleston, South Carolina, reported a $400,000 savings in one year as a result of the

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[1]Ibid., pp. 16-17.

[2]George Berkwitt, "Does Zero Defects Really Work?", Dun's Review, (August, 1966), p. 25.

[3]Ibid.

[4]Halpin, Zero Defects, p. 17.

ZD concept.[1]

6. A naval shipyard reported a reduction in its error rate from 48.8 errors per week before ZD, to 13.2 errors per week after ZD was implemented.[2]

Although these results are impressive, they primarily represent initial successes of Zero Defects programs. In order for a complete evaluation to be conducted of Zero Defects, it would be beneficial to determine the long-range results, i.e., did the error rate continue to decrease and finally level off at a rate that management considers satisfactory? Unfortunately, statistics of this nature are not available from material presently published. This is an area that is recommended for additional study to access the effectiveness of Zero Defects programs.

Employee Opinion of Zero Defects

The ultimate success of Zero Defects is dependent upon people. Although management may judge the effectiveness of the program on the measurable benefits derived from Zero

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[1]Barbara E. Moore, "Right the First Time!", Newsletter, Magazine of the U. S. Navy Supply Corps, Vol. 32, No. 12, (December, 1969), p. 7.

[2]Ibid.

Defects, those benefits which cannot be quantitatively measured should also be considered. Based upon previous analysis of defects in goods and services, some of these latter benefits are as follows:

1. Avoidance of losses which result from defective products or services that could cause death or injury to the users.

2. Avoidance of losses in profits which result from customers who become dissatisfied with the frequency of defects that occur in the product or service.

3. Avoidance of losses in profits which can result from the loss of customers because the quality costs, i.e., prevention, appraisal, and failure, result in higher product or service cost to the consumer.

4. Avoidance of losses which result from delays in the performance of the various functions throughout the organization.

Since these benefits depend at least in part on the degree to which people are motivated toward the goals of the organization, it is helpful to be aware of employee opinion of Zero Defects programs in evaluating its effectiveness.

In an attempt to find out what employees thought of the

Zero Defects program in one company, management conducted a survey of their workforce. Edgar F. Huse reported the results of this survey in an article in Personnel, an American Management Association magazine.[1] The article did not reveal the nature of work the employees performed. It did state that the questionnaires were submitted to 430 hourly, 201 weekly, and 120 monthly paid employees. The significant findings of the employees' feelings were as follows:

1. Zero Defects is a beneficial program--66 per cent indicated it was worth a great deal, as opposed to 9 per cent who indicated it was of little worth.

2. Zero Defects had resulted in some improvement in quality of performance--only 10 per cent saw a great amount of improvement in quality before ZD, as opposed to 30 per cent after the program was initiated.

3. Zero Defects resulted in improving communications within the company--40 per cent said they felt free to submit new ideas after the program was initiated, compared to 21 per cent before ZD.

4. Submission of ZD ideas resulted in a source of personal satisfaction to the employees--47 per cent indicated

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[1]Edgar F. Huse, "Do Zero Defects Programs Really Motivate Workers?", Personnel, (March, 1966), pp. 17-20.

it was of great value, as opposed to 11 per cent to whom it was an unimportant source of job satisfaction.

5. More emphasis should be put on Zero Defects--84 per cent felt more improvement should be made in quality performance and 67 per cent felt more improvements needed to be made in opening communication channels.[1]

Another survey conducted to determine employee opinion of Zero Defects programs was made in the Goodyear Aerospace Corporation. This survey included a sample of twenty-five male employees from each of five different departments: (1) administration, (2) production, (3) sales, (4) engineering, and (5) research and development. The questionnaire consisted of twelve items which were open-end questions on various phases of the ZD program. Also, a graphic scale was included on which the respondents were asked to rate the program's over-all value. Zero represented no value and ten represented great value on the scale. The most significant findings of this survey are as follows:

1. The over-all value of the program followed fairly closely the job function order. The mean group ratings for this question were: (1) production--6.4, (2) administration--

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[1]Ibid.

5.6, (3) sales--4.8, (4) engineering--4.6, and (5) research and development--2.6.

2. In response to the question where the employees were asked to give their opinion of the purpose of the ZD program: (1) 47 per cent indicated it was to develop individual responsibility and pride in their work so that it would become error-free, (2) 29 per cent thought it was to improve quality and quantity of work in order to cut costs, (3) 13 per cent gave miscellaneous responses, such as to promote job security and to keep the company competitive, (4) 7 per cent said it was political in nature, and (5) 4 per cent said it was to reduce production errors only.

3. The question concerning individual and group recognition in the ZD program were answered: (1) 46 per cent felt individual awards were good, as opposed to 21 per cent who felt they were not good, and (2) 41 per cent liked group recognition, where 24 per cent disliked them.

4. The answers to the question regarding the last time the ZD program changed the way they performed their job were: (1) 50 per cent said the program had not changed their job performance because they had always tried to do their best

work, (2) 13 per cent gave specific changes in job performance, and (3) 12 per cent indicated their performance had improved in general.[1]

The final survey to be reviewed was conducted at the Naval Ammunition Depot, Crane, Indiana. The survey was conducted of all employees of the depot, and the following findings emerged from the study:

1. An extremely large percentage of the employees felt the ZD program was worthwhile, and 70 per cent indicated it should be continued.

2. Production line workers indicated an extremely favorable attitude toward ZD, but a large proportion of the engineers were not yet convinced of the value of ZD.

3. A high correlation was found between shops that were enthusiastic about ZD and those in which improved performance were measured.[2]

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[1]Gerald V. Barrett and Patrick A. Cable, "Zero Defects Programs: Their Effects at Different Job Levels", Personnel, (November, 1967), pp. 42-44.

[2]"Naval Ordnance on ZD Trajectory", Call Sign: ZD, NAVMAT P-4800, August, 1969, pp. 2-4.

Summary and Conclusions

This chapter has compared Zero Defects programs with some of the more significant approaches to the problem of motivation, and has surveyed the results various organizations have obtained utilizing ZD programs.

Although Zero Defects does not exactly follow any of the more significant approaches to motivation, it most closely resembles the self-motivation approach and is considered to be compatible with it. The following similarities between Zero Defects and the self-motivation approach are found:

1. Both assume man is motivated and it is management's responsibility to provide the opportunity for him to use this motivation toward organizational goals.

2. Both contend management has responsibility for building a feeling of mutual contribution by all members of the organization.

3. Both emphasize the importance of providing for man's higher level needs, esteem and self-actualization, in the motivational process.

4. Both realize the importance of the individual in the motivational process.

Numerous organizations have reported tremendous reductions in their error rate and a correspondingly large increase in savings due to the cost reductions made possible by a Zero Defects program. These reports have generally covered short periods of time and were achieved at the beginning of the Zero Defects program in the organization. This leaves unanswered the question of long-term results of Zero Defects, and suggests an area for further study.

The three studies surveyed were conducted to determine employee opinion of Zero Defects programs. These studies appear to suggest the following:

1. Most employees believe Zero Defects programs are beneficial to the organization and to the employees themselves.

2. Although Zero Defects programs have resulted in improvements in the reduction of defects and improved communication, much remains to be done in these areas by management and employees.

3. Zero Defects programs may be more effective in the more highly structured jobs (e.g., production and administration) than in those with less structure (e.g., sales, engineering, and research and development).

4. All employees are not motivated by Zero Defects programs.

5. Management of companies with Zero Defects programs has not been successful in imparting the purpose of ZD to all employees.

CHAPTER V

CONCLUSION

The problem of motivating people in the work environment is one of stimulating individuals to action toward the accomplishment of organizational goals. This requires an understanding of the factors that influence human behavior. These factors include the motivation of an individual, his past experiences, his physical capabilities, and the environmental situation. Motivation of an individual is the most complex of the factors, and despite the contributions of the behavioral scientists over the past forty years, much remains to be learned about developing an effective motivational program.

Most approaches to motivation have emphasized providing for one or more of the various needs of individuals as a means of securing their cooperation to work more effectively and efficiently. The economic approach assumes individuals are motivated only by satisfying their needs for money, which enables them to meet their requirements for food, clothing, and

shelter. The hygenic approach stresses the individual's needs for good wages, fringe benefits, good working conditions, and good supervision as the method for motivating people. An individual's needs for acceptance, identity, and sense of belonging are recognized as the motivators of people in the social approach. The self-motivation approach asserts the responsibility of management to provide an atmosphere that is conducive to individuals of the organization being able to satisfy their needs for esteem and self-actualization.

Each of these approaches have oversimplified and overgeneralized in their attempts to explain motivation. All of an individual's needs must be considered in the motivational process since they vary from individual to individual and may vary in the same individual from time to time. In the absence of an all-inclusive approach to the problem of motivation, it is important for management to experiment with various techniques in an effort to determine those which are the most effective in their organization.

A Zero Defects program is one technique that has been successfully used by many government and private organizations to reduce defects in the goods they produce and/or the services

they provide by emphasizing the prevention of errors regardless of the cause. The program utilizes various techniques to accomplish its purposes of ensuring: (1) employees are aware of the importance of defect-free goods and services, (2) each employee is aware of his importance to the organization, (3) employees are aware of management's requirements for quality, (4) communication lines are open for employees to identify any existing or potential cause of error, (5) the employees are informed of their actual performance, and (6) outstanding individual and group performance is rewarded.

The approach taken by ZD is positive in that it assumes people want to do good work, and does not threaten them if they do not pledge their support for the program. It is directed toward providing for an individual's needs of esteem and self-actualization. Rewards in the ZD concept are, therefore, intrinsic, rather than extrinsic. Management is responsible for providing an opportunity for employees to direct their existing motivation toward the accomplishment of the organization's goals. The Zero Defects philosophy of motivation is compatible with the self-motivation approach because of the similarities in their assumptions about man and what motivates him.

It is strongly believed that a Zero Defects program is an effective technique that can be utilized by management as a part of its motivational program. While the concept is not a panacea for all organizations, it includes many sound management practices that should be used whether or not they are under the name Zero Defects. This does not mean an organization that initiates a Zero Defects program will automatically solve its motivational problem. It has helped many organizations to reverse the undesirable trend of defects in its goods and services, but it remains for each individual organization that establishes ZD to evaluate the effects of the program on their own organization. This involves comparing the costs of the program with the benefits derived. When considering the benefits derived, management must measure those that reflect the condition of the internal state of the organization, as well as those that are reflected by statistics on production, sales, costs, and earnings. The former measurements have been frequently neglected by management because of the difficulty in measuring, analyzing, and interpreting such factors as loyalty, skills, motivations, and capacity for effective interaction, communication, and decision making. However, both measurements

must be made to obtain a meaningful evaluation of any motivational technique.

In conclusion, it is not believed that Zero Defects is a complete motivational program because it fails to provide for all an individual's needs. Also, it will not in itself entirely provide for the needs which the program attempts to satisfy. A Zero Defects program that is supplemented with sound management practices in planning, organizing, and controlling in addition to other proven techniques of motivation will help to ensure a successful motivational program.

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