Pratima Prakashan

Motivation & Leadership An Innovative Mathematical Approach

Dr. Sachin Kumar Srivastava

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Motivation & Leadership
An Innovative Mathematical Approach

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Motivation & Leadership
An Innovative Mathematical Approach

(For Graduate, Post Graduate (MBA) and Research
Student's of Management for Indian
and International Universities)

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THIS BOOK
IS
DEDICATED TO
MY LITTLE STARS
SHUBH
VAISHNAVI,
&
AANYA

PREFACE

The prime objective of this book is to provide a full innovative knowledge about Motivation and Leadership. The human resource is the most critical resource in any organization because through the proper utilization of human recourse economic and material investment bear fruit. It is the effort and performance of both managers and workers that results in productivity which in turn stimulate socio-economic growth. Poor performance of managers and workers makes the organization unproductive and contributes to slow economic growth. Hence, the effective utilization of human resource for productivity improvement should be the primary concern of all.

When we talk about human resource in any working scenario where a definite production is regularly carried out, requires two sets of human resource, a Managerial Group and the Worker Group. Good relation; mutual understanding; and faith should prevail over the two groups at all times for desired output. Even if there is a good relation between these two groups, still there is a scope for enhancing the productivity while maintaining the quality. There is always scope for enhancing the productivity by proving good motivation to working class.

This book provides the innovative mathematical equations/ formulas to calculate the motivational and leadership value of any individual for the betterment of his / her and their organization. It also provides mathematical equations/ formulas to calculate the crisis level value of any organization and the technique to improve the level of Motivation, leadership of any individual.

The content of book fulfills the requirement of the research scholars, Post graduate and Graduate students. This book is especially very useful for the Research Scholars working in the fields of Management & Administration.

Dr. Sachin Kumar Srivastava

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Part I
Introduction

CHAPTER 1

INTRODUCTION

Every organized work has some definite size and identity, which makes the work important and exclusive. Every individual tries to do the same work with different enthusiasm and courage and comes to the same or sometimes different results. One thing is common in this process and that is motivation but the level of motivation also varies with the individuals. If we discuss about the motivation we will find the different type of motivation and so many philosophers have discussed a lot about motivation. And if we analyses them we will find the three stages of motivation i.e. inner motivation of an individual relates to inner gunas secondly self motivation means need based/process based/ reinforcement based motivation theories and **nish kaam** work, a theory of Bhagwat Gita. And the last one is outer motivation i.e. motivation through outer work like Leadership involvement etc, with which we are able to manage the overall crisis, its stages and recovery.

In the next chapter, Mathematical modeling and Motivation we have discussed about the different aspects of motivation and the role of human in working organizations. This chapter is divided in other sub chapters like Human Gunas, Samkhya Philosophy, Nature of Duality, Theory of Existence, Characteristics of the Three Gunas, How a person is affected by the three Gunas, Samkhya Gunas impact on Working Process of an Organization, Analysis of Impact, Conclusion and Suggestions, Computer Programme based on above Equations. In Human Gunas & Samkhya Philosophy chapter we have discussed about an organization having a large number of persons employed in it, has two type of working categories, managerial and blue collar persons. These types of categories of workers show three similar characteristics which are distinct output achievement environment, frustrating environment and dictatorial environment. It gives three demarcable state of working but when samkhya philosophy is applied to analysis, it gives different level of work environment achievement, dictatorial environment, and frustrating atmosphere.

According to the Samkhya philosophy, Prakriti is composed of three Gunas or forces, called Sattva (purity, light, and harmony), Rajas (passion, activity, motion) and Tamas (inertia, darkness, inertness, inactivity)

Guna means a cord. The Gunas bind the soul with a triple bond. These Gunas are not the Nyaya-Vaiseshika Gunas. They are the actual substances or ingredients, of which Prakriti is constituted. They make up the whole world evolved out of Prakriti. They are not conjoined in equal

quantities, but in varying proportions, one or the other being in excess. Just as Sat-Chit-Ananda is the Vedantic trinisty, so also the Gunas are the Samkhyan trinity.

Sattva when in equilibrium is pleasing, and is capable of manifesting others, When Sattva prevails, and there is peace or tranquility. Rajas are dynamic in nature, which is expressed as Raga-Dvesha, likes or dislikes, love or hatred, attraction or repulsion. Tamas is that binding force with a tendency to lethargy, sloth and foolish actions. It causes delusion or non-discrimination and is static in nature.

When Sattva is predominant, it overpowers Rajas and Tamas. When Rajas is dominant, it overpowers Sattva and Tamas. When Tamas is predominant, it overpowers Rajas and Sattva. In the next part of the chapter we have explained the Nature of Duality and Theory of Existence.

In this continuation we have discussed about the Characteristics of the Three Gunas & How a person is affected by the three Gunas, this point gives the real picture of the working situation.

While discussing Samkhya Gunas impact on Working Process of an Organisation we have prepared a mathematical model to show the Gunas of collective group and their profound impact on working of organization. These can be evaluated by setting of questions, and computing the result.

An organization where substantial number of people is engaged at work can broadly be divided into two different groups of people, i.e., the Blue collar & Managerial Group. A group of people can have different feelings about the working methodology. It may be right or wrong. Let Blue collar be represented by “W”. If they have opinion that working methodology is right, it can be denoted by W(r) and if their opinion about the working methodology is wrong, it is denoted by W (w). Similarly, the person belonging to managerial group can be denoted by “M”. If the opinion of the managerial group about the working methodology is right then it can be denoted by M(r) and if the opinion about the working methodology is wrong, it can be denoted by M(w). The joint impact of these feelings can be expressed in following optional results of four possible combinations. The result is denoted by word R.

In the last of the first part of the chapter we have concluded the whole mathematical modeling and literature and also programmed the whole mathematical model in to computer based programme.

In the second part of the chapter Mathematical modeling and motivation we have discussed about the Motivation and its Unit. In this chapter we have elaborated the Motivation has been in practices since the life of mankind. It is such an effort which requires to be quantified for better management technique. This research work tries to quantify the estimation of motivation efforts using entropy and ability of manpower involved in certain organization.

In any development or production unit it is observed that either labor or used more and machines are used less or labor are employed less, and more work is carried out by the machines. In both cases, participation of manpower is necessary. One requires more capital to purchase machines; other depends upon the availability of skilled labor. As in either method, skilled

manpower is involved; it requires being approximately motivated to work on full capacity and dedication. The motivation therefore is an incentive & there is no unit to measure it presently. The present work is an effort to define the measuring way for motivation.

To achieve the desired quantum of good with quantity, motivation is required to people involved in the production activities to do the work with dedication, with the available machines & raw materials in the production organizations where raw materials, machines & manpower are involved. Through persuasion & motivation such situations can be developed in which the worker can think their work or job a respectful and honorable. Their needs should be appreciated and should be met if possible. The organization should review & should reinforce the corrective action where it is necessary. Motivation has been categorized as given below.

- Need based/ Content Theories
- Process based/ Cognitive theories
- Reinforcement based
- Nish-Kaam Theory

There are few other situations in working scenario that generates automatically the enthusiasm to work-hard. This can be called as self generated motivation. There is one other process of motivation and that is of recognition of the expertise of the product. The demand for the products is another motivating factor. The mutual competition of organization becomes at time a great deal of motivating force. This can be explained by giving the example of war times, where it has been experienced that workers worked over time, without charging extra wages for producing the product required for the war.

In this continuation we have further discussed about the Analytical representation of Motivation, the motivation study which has been limited to descriptions and is evaluated abstractly to find that they are poorly motivated or deeply motivated.

While carrying the study of communication, similar situation was experienced for the evaluation of information.

'Sennen 'resolved and described by using entropy for the measurement of information (1948), faced similar situation to evaluate the complexity of programs. He too used the term entropy through probability of occurrence of fault in the program, and interaction of 'Do loop'. We are also met similar situation for metering and estimation of motivation.

In analyzing Working Ability, The study tries to find out the level of motivation of persons carrying out the job. There can be many situations in the working scenario. The people engaged on the job may be fully motivated but due to constrains and limitations on him a output may be partial. We can introduce a factor ABILITY for evaluation in totality of the motivation with ability, the term ability 'A' can assume values between 0 to 1. Resembling with the value of probability which measure the chance for devotion of man involved in work depending upon the mental & physical condition,

Chance is a typical situation representation of human behavior and can be expressed using

operator 'Logarithmic'.

If chance is represented using Lemma by (g < 1) then Working ability will be,

$$Wa = \log 1/g$$

After substituting the value of Wa in the equation of motivation equation. We get the impact of the motivation [EM] as given below.

$$EM = Mot * Wa$$

The Theory of Growth explained as Motivation can be generated in workers, which inspires the worker to work and produce more in quality. It has been realized that motivation can have a higher value, if the workers are paid to the level of satisfaction. The management meets their essential needs out. The deficiencies of process are shorted out at time and reinforced the manpower, raw materials, supply lines and even technology.

There are large numbers of examples of Spiritualism of Bhagwat Gita which have direct impact on the motivation. If Spiritualism of Bhagwat Gita is infused in workers, their Motivation can be of highest degree. For such type of philosophy, it has been difficult to evaluate Spiritualism of Bhagwat Gita factor. The infusion of Spiritualism of Bhagwat Gita obviously can be categorized in big O representation. Along with above parameters if Bhagwat Gita's spirituality which can be scaled by theory of growth such as $\theta(n), \theta(n \log n), \theta(n^2), \ldots\ldots\ldots\ldots \theta(n^K)$ The synchronization of growth function and motivation will lead to excellent probability factor to be opted optimally. This can be the area of research to be formulated as follows.

$$EM = Mot * Wa * \theta(.)$$

And finally we have formulated the final equation for Motivation Estimation. We have also prepared a computer programme for the above mathematical model. Third chapter, Mathematical Model for Leadership elaborated the different issues like- Introduction about the whole topic – in which we have discussed about an organization where the output is based on multidiscipline working places. Then the working should be such that the productivity should be highest. The organization requires a leader, who should motivate the team and its member of each discipline work place. The smartness of the leader should be such that it motivates every individual of every team to work with their best of ability. The leadership value of such a man is estimated highest. There may be another situation that every team, works independently and causally. The productivity of such working culture is poor and the value of leadership is lowest. For the purpose of study this value can be assume to be zero. Representing a poor or even working without leader in the organization. It has been observed at time that the working effects negativity simply be the presence of the leader. This may be because of dissatisfaction generated in workers or members of the team by the behavior of the leader. This affects adversely in the in the quality of products and also we have discussed about the Leadership Theories like Great Man Theory, Trait Theory, Behaviroual Theory, Participative Leadership, Situational Leadership, Contingency Leadership, Transactional Leadership, and Transformational Leadership.

A mathematical model is proposed to develop for the leadership of an organization. Where

there is M team each headed by an in charge of the team. It is further assume that there are P workers in each team. It is assume that the input raw material is of quality and is fully utilized.

NK model developed by Kauffman and Levin (1987) for studying genome evolution, Solow et. at. (2002) applied the model to the process of replacing members of a team. In the paper of Solow and Leenaworng, they studied the role of a leader in achieving cooperation among the team members. Leader shows the impact on the team's performance.

Organization measures various role of a leader in different situation. it is obvious that the most important role is motivation. Organization tries to compare between the performance of team, with and without the leadership. Model includes controllable parameters, whose values reflect the amount of interdependence among team members as well as the skill of the leader and variability.

$$P(x,Z) = \frac{\Sigma \frac{N}{i-1} P_i (x_i, Z)}{N}$$

In the continuation we have frame a mathematical model in which we have derived some mathematical formulas by which we can calculate the Leader's Role & Work, Working Ability of a Leader, Comparison of Leader's Ability, Circumstantial Impact on Leader and finally we conclude the whole chapter we have also prepare the computer based programmes for all equations.

In chapter four we have discussed about the Mathematical Model for Crisis Estimation and its Management. In first two parts we have discussed about introduction of crisis its nature and components. In next parts we have discussed about a new type of crisis that is impulsive crisis. And in rest of the chapter we have formulated a Mathematical Model for Crisis. In this we have calculated the Recovery from Crisis, Estimation of Damage due to Crisis, Crisis Analysis in Different Departments and finally Loss Estimation due to Crisis. After the whole discussion we have concluded the chapter and also prepared the computer programme for the equations.

In this chapter we understand that every physical phenomenon can be formulated and modeled mathematically. So many research scopes are available in this area where anyone can add on so many new things which we are not covered in this research work.

Part II

MATHEMATICAL MODELING AND MOTIVATION

CHAPTER 2

1. HUMAN GUNAS

A. INTRODUCTION

Before the discussion of dimensions and the sphere of motivation, it should be search out the origin of the word- Motivation[1]. The word motivation is derived from the word motive which means- that which causes/ urges or force somebody to act. Action spring from mind, Human mind is always governed with Prakriti. This Prakriti consist of three Gunas ie., Satva, Rajas and Tamas. These Gunas are present in every person in different proportions but one of them dominates the human mind at a time. When it tries to affect and judge the effect of motivation on a man or a group of workers, it must categories the people on the basis of their dominating Gunas[2]. In the Bhagwat Gita Lord Krisna says –(Chapter III Sloks- 5).

Na hi kaschit kshanamapi jatu tishthya akarmakritu I
Karyate hyavashah karma sarvah prakriti jah gunaih II sloka 5

न हि कश्चित् क्षणमपि जातु तिष्ठ्य अकर्मकृतु।
कार्यते ह्यवशः कर्म सर्वः प्रकृति जः ग्णैः।। श्लोक 5 ।।

(It means- surely, none can ever remain inactive even for a movement; for everyone helplessly driven to action by nature born qualities i.e., Prakriti)

So it must classify the persons or workers on the basis of their dominating Gunas and then manage to motivate them. Satva Guna is the positive force; Rajas Guna is the semi positive while Tamas is the negative one.

Peaceful everlasting, useful and good results can be expected only from the satwik workers. Rajas and Tamas groups should be converted to satva Guna.

Plenty of examples of Rajas and Tamas Guni persons from the word history like Hitler, Mussolini, Alexander, Changez Khan, Ravan and Kansa who won the lands and money but were never attributed as victorious. On the other hand the satwik victory of Lord Rama, Lord Krisna, Lord Christ, Socrates, Abraham Lincoln and Gandhi ji will remain immortal and motivate the generations to follow.

B. SAMKHYA PHILOSOPHY

An organization having a large number of persons employed in it, has two types of working

categories - managerial and working. Such categorization of workers has three distinct output environments - achievement environment, frustrating environment and dictatorial environment. The present work discusses management techniques which have a profound impact on the systems.

According to the Samkhya philosophy[2, 3,] Prakriti is composed of three Gunas or forces, named Sattva (purity, light, and harmony), Rajas (passion, activity, motion) and Tamas (inertia, darkness, inertness, inactivity)

Guna means a cord. The Gunas bind the soul with a triple bond. These Gunas are not the Nyaya-Vaiseshika Gunas. They are the actual substances or ingredients of which Prakriti is constituted. They make up the whole world evolved out of Prakriti. They are not conjoined in equal quantities, but in varying proportions, one or the other being in excess. Just as Sat-Chit-Ananda is the Vedantic trinity, similarly Gunas are the Samkhyan trinity.

Sankhya, also **Samkhya,** (Sanskrit: सांख्य, IAST: sānkhya - 'enumeration') is one of the six schools of classical Indian philosophy. Sage Kapila is traditionally considered to be the founder of the Sankhya school. It is regarded as the oldest of the philosophical systems in India.

Sankhya was one of the six orthodox systems (astika, those systems that recognize Vedic authority) of Hindu philosophy**. Srila Prabupada has pointed out that the original theistic Sankhya philosophy was propounded by sage Kapila in the Srimad Bhagavatam long before another atheistic form of Samkhya-yoga was enunciated by an imposter Kapila.

1. Yoga	**Practical methods for direct experience:** Yoga systematically a deal with all of the levels of one's being, striving to experience the eternal center of consciousness. Yoga is best described in the Yoga Sutras and involves systematic witnessing of your inner states, so as to experientially go beyond all of them to the center of consciousness. Yoga is often called Sankhya-Yoga, as Yoga contains the practical methods to realize in direct experience the truths of Sankhya philosophy.
2. Samkhya	**Framework of manifestation:** Sankhya philosophy offers a framework for all the levels of manifestation, from the subtlest to the grossest. Sankhya comes from samyag akhyate, which literally means that which explains the whole. Sankhya deals with Prakriti (matter), purusha (consciousness), buddhi or mahat (intelligence), ahamkara (I-am-ness), three gunas (elements of stability, activity, and lightness), mind (manas), cognitive and active senses (indriyas), and the

	five subtle and gross elements (earth, water, fire, air, and space). In light of its breadth, it contains all of the domains of Vaisheshika, Nyaya, and Mimasa.
3. Vedanta	**Contemplative self-inquiry:** Vedanta philosophy and practice provides contemplative methods of self-inquiry leading to the realization of one's true nature, that which is not subject to death, decay, or decomposition. A major key of these practices is contemplation on the Mahavakyas. The teachings of Vedanta are best captured in the books of the Upanishads. The text, Vivekachudamini (Crest Jewel of Discrimination) by Adi Shankaracharya is an excellent source, and is available in English translation.
4. Vaisheshika	**Physical sciences:** The Vaisheshika system was developed by Prashastapada and emphasizes the physical sciences such as chemistry. It includes exploring the elements of earth, water, fire, air and space, as well as time,mindandsoul.
5. Nyaya	**Reasoning:** The Nyaya system was founded by the ancient sage Gautama, and deals with logic, the process of reasoning. Doubt is considered a prerequisite for philosophical inquiry. Other systems of Indian philosophy draw on this process.
6. Mimasa	**Freedom through action:** The Mimasa system was founded by Jaimini and pursues freedom through action. It has a detailed philosophy related to ritual, worship and ethical conduct, which developed into the philosophy of karma.

Table 1: Source; List of six schools of Indian philosophy written by Swami Jnaneshvara Bharati www. SwamiJ.com

The major text of this Vedic school is the extant Samkhya Karika, written by Ishvara Krishna, circa 200 AD. There are no purely Sankhya schools existing today in Hinduism, but its influence is felt in the Yoga and Vedanta schools[4]

Sankhya is an enumerationist philosophy but many scholars have misunderstood it as strongly dualist. That is an inaccurate view. Sankhya philosophy regards the universe as consisting of two realities: Purusha (consciousness) and Prakriti (phenomenal realm of matter). Purusha, the

cosmic consciousness, is the basis of Prakriti, its material nature. They are the experiencer and the experienced, not unlike the res cogens and res extensa of Descartes ((René Descartes (French pronunciation: [Rene dekabt]), (March 31, 1596 – February 11, 1650), also known as Renatus Cartesius (latinized form), was a highly influential French philosopher, mathematician, scientist, and writer. He has been dubbed the "Father of Modern Philosophy,") and has used the res extensa and its opposite res cogitans in his philosophical system called the Cartesian system. Res extensa was used to denote the physical world and res cogitans was used to denote the thinking being, the being that perceives its own belongings.)[1, 5]

The corollary of this dualism is that the "I", the subject, is of another "substance" than the world and, hence, does not depend on this world to truly exist. Actually, Descartes here presents a subjectivist point of view: it is the subject that determines the world around him, and not the other way around.

Subject ("res cogitans") -> world ("res extensa")).

Prakriti further bifurcates into animate and inanimate realms. On the other hand, Purusha separates out into countless Jivas or individual units of consciousness as souls which fuse into the mind and body of the animate branch of Prakriti. This was a dualistic philosophy. But there are differences between Sankhya and Western forms of dualism[6].

In the West, the fundamental distinction is between mind and body. In Sankhya, however, it is between the self (as Purusha) and matter (Prakriti). The real Sankhya (as a theistic school of thought) can be thus seen as a type of dualist monism which is quite different from Western forms of dualism

The earliest extant text of this school is Sāmkhya Kārikā of Iśvarakrsna (3rd century AD). Iśvarakrsna in his Kārikā described himself as being in the succession of the disciples from Kapila, through Āsuri and Pañcaśikha. Gaudapāda wrote a commentary on this Kārikā.

The next important work is Vācaspati's Sāmkhyatattvakaumudī (9th century AD). Nārāyana's treatise Sāmkhyacandrikā is based on the Kārikā. The Sāmkhyapravacana Sūtra is assigned to the 14th century, as Gunaratna (14th century) did not refer to this text but referred to the Kārikā.

This text consists of 6 chapters and 526 sūtras. The most important commentary on the Sāmkhyapravacana Sūtra is Vijñānabhiksu's Sāmkhyapravacanabhāsya (16th century). Anirruddha's Kāpilasā□khyapravacanasūtrav□tti (15th century) and Mahādeva's Sā□khyapravacanasūtrav□ttisāra (c. 1600) and Nāgeśa's Laghusā□khyasūtrav□tti are the other important commentaries on this text.

Broadly, the Sankhya system classifies all objects as falling into one of the two categories: Purusha and Prakriti. Metaphysically, Sankhya maintains an intermingled duality between spirit/consciousness (Purusha) and matter (Prakrti)[9].

- **Purusha**

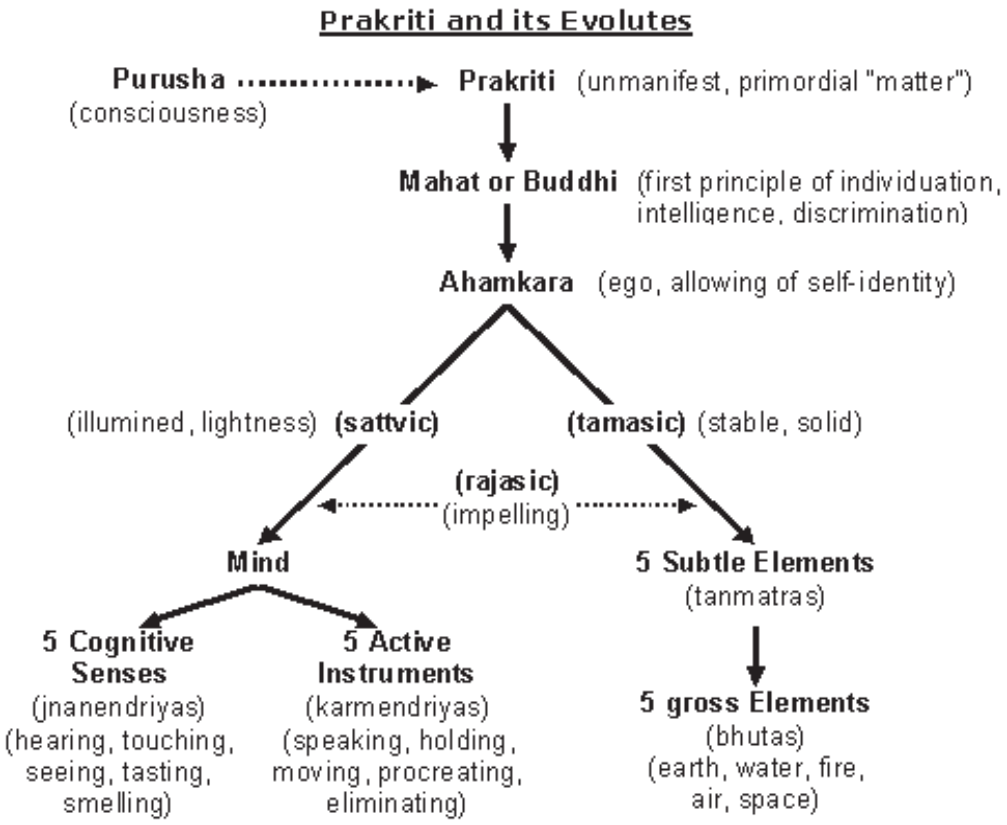
Purusha is the Transcendental Self or Pure Consciousness. It is absolute, independent,

free, imperceptible, and unknowable, above any experience and beyond any words or explanation. It remains pure, "nonattributive consciousness". Purusha is neither produced nor does it produce.

- **Prakriti**

Prakriti is matter. Matter is inert, temporary, and unconscious. It is composed of three qualities (trigunas) of the self. They are:

- **Sattva -** goodness, knowledge, happiness, truth, light of intelligence
- **Rajas -** passion, desire, thirst, unrest, longing, attachment, greed, activity
- **Tamas-** ignorance, miscomprehension, indolence, indifference, darkness, inertness, delusion



Source: Swami Jnaneshvara Bharati in www.swami.com/acccessed on 23/07/2007

All physical events are considered to be manifestations of the evolution of Prakrti, or primal nature (from which all physical bodies are derived). Each sentient being is a Purusha, and is limitless and unrestricted by its physical body. Samsaara or bondage arises when the Purusha does not have the discriminate knowledge and so is misled as to its own identity, confusing itself with the physical body - which is actually an evolute of Prakriti. The spirit is liberated when the discriminate knowledge of the difference between conscious Purusha and unconscious Prakriti is realized[7*].

- **Ishwara (Creationist God)**

The original theistic Sankhya system was revived which included Ishvara. There is a common misunderstanding that the concept of Ishvara was incorporated into the Sankhya viewpoint only after it became associated with the theistic Yoga system of philosophy. This can be verified by studying the original theistic Sankhya philosophy described in Srimad Bhagavatam.

C. Nature of Duality

According to Sankhya, the efficient cause of the world is Purusha and the material cause is Prakriti[9]. Here Purusha stands for the 'Supreme Self' and Prakriti stands for 'Matter'. Purusha (Self) is the first principle of Sankhya. Prakriti is the second, the material principle of Sankhya.

D. Theory of Existence

The Sankhya system is based on Satkaryavada. According to Satkaryavada, the effect pre-exists in the cause. Cause and effect are seen as different temporal aspects of the same thing - the effect lies latent in the cause which in turn seeds the next effect[8].

More specifically, Sankhya system follows the Prakriti-Parinama Vada. Parinama denotes that the effect is a real transformation of the cause. The cause under consideration here is Prakriti or more precisely Mula-Prakriti (Primordial Matter). The Sankhya system is therefore an exponent of an evolutionary theory of matter beginning with primordial matter. In evolution, Prakriti is transformed and differentiated into multiplicity of objects. Evolution is followed by dissolution. In dissolution the physical existence, all the worldly objects mingle back into Prakriti, which now remains as the undifferentiated, primordial substance. This is how the cycles of evolution and dissolution follow each other[10].

Sankhya theorizes that Prakriti is the source of the world of becoming. It is pure potentiality that evolves itself successively into twenty four tattvas or principles. The evolution itself is possible because Prakriti is always in a state of tension among its constituent strands -

Sattva - a template of balance or equilibrium;

Rajas - a template of expansion or activity;

Tamas - a template of inertia or resistance to action.

All macrocosmic and microcosmic creation uses these templates. In twenty four principles some evolve are -

Prakriti - The most subtle potentiality that is behind whatever is created in the physical universe, also called "primordial Matter". It is also a state of equilibrium amongst the Three Gunas.

Mahat - first product of evolution from Prakriti, pure potentiality. Mahat is also considered to be the principle responsible for the rise of buddhi or intelligence in living beings.

Ahamkara or ego-sense - second product of evolution. It is responsible for the self-sense in living beings. It is also one's identification with the outer world and its content.

Panch Tanmatras - are a simultaneous product from Mahat Tattva, along with the Ahamkara. They

are the subtle form of Panch Mahabhutas which result from grossification or Panchikaran of the Tanmatras. Each of these Tanmatras are made of all three Gunas.

Manas or "Antahkaran" - evolves from the total sum of the sattva aspect of Panch Tanmatras or the "Ahamkara"

Panch jnana indriyas or five sense organs - also evolves from the sattva aspect of Ahamkara.

Pancha karma indriya or five organs of action - The organs of action are hands, legs, vocal apparatus, urino-genital organ and anus. They evolve from the rajas aspect of Ahamkara.

Pancha mahabhuta or five great substances - ether, air, fire, water and earth. They evolve from the "tamas" aspect of the "Ahamkara". This is the revealed aspect of the physical universe[11.]

The evolution of primal nature is also considered to be purposeful - Prakrti evolves for the spirit in bondage. The spirit who is always free is only a witness to the evolution, even though due to the absence of discriminate knowledge, he misidentifies himself with it.

The evolution obeys causality relationships, with primal Nature itself being the material cause of all physical creation. The cause and effect theory of Sankhya is called Satkaarya-vaada (theory of existent causes), and holds that nothing can really be created from or destroyed into nothingness - all evolution is simply the transformation of primal Nature from one form to another.

The evolution of matter occurs when the relative strengths of the attributes change. The evolution ceases when the spirit realizes that it is distinct from primal Nature and thus cannot evolve. This destroys the purpose of evolution, thus stopping Prakrti from evolving for Purusha.

Samkhyan cosmology describes how life emerges in the universe; the relationship between Purusha and Prakriti is crucial to Patanjali's yoga system. The evolution of forms at the basis of Sankhya is quite remarkable. The strands of Samkhyan thought can be traced back to the Vedic speculation of creation. It is also frequently mentioned in the Mahabharata and Yogavasishta[12, 13.].

E. CHARACTERISTICS OF THE THREE GUNAS:-

It is said that Sattva's equilibrium is pleasing, and is capable of manifesting others, when Sattva prevails, and there is peace or tranquility. Rajas are dynamic which is expressed as Raga-Dvesha, likes or dislikes, love or hatred, attraction or repulsion. Tamas is that binding force with a tendency to lethargy, sloth and foolish actions. It causes delusion or non-discrimination and is static in nature.

When Sattva is predominant, it overpowers Rajas and Tamas. When Rajas is dominant, it

Sattva	***Rajas***	***Tamas***
Virtue	Passion	Dullness
Beautiful, good, wise	Active, fierce	Dark, stupid, ugly
Intelligence & self consciousness	Energy	Sloth

Source: Samkhya Philosophy; Based on: Worthington V (1982), A History of Yoga; Arkana

overpowers Sattva and Tamas. When Tamas is predominant, it overpowers Rajas and Sattva. Prakriti is comprised of three qualities (Gunas) which interact in the makeup of physical things in a manner not unlike the relationship between atoms and molecules. The characteristics of the three Gunas are illustrated in the following table.

F. HOW A PERSON IS AFFECTED BY THE THREE GUNAS:-

The above referred three Gunas are found in every person. Sometimes, Sattva prevails in him, and then he is calm and tranquil. He reflects and meditates[10]. When Rajas prevails in him then he does various sorts of worldly activities. He/ She is passionate and active[11]. Sometimes, Tamas prevails. He becomes lazy, dull, inactive and careless. Tamas generates delusion[12].

Again, one of these Gunas is generally predominant in different men. A Sattvic (Pious/Saintly activity) person is virtuous. He leads a pure and pious life. A Rajasic (Worldly affairs) man is passionate and active. A Tamsic (Nefarious activity) man is dull and inactive. Sattva makes a man divine and noble, Rajas makes him thoroughly human and selfish, and Tamas makes him bestial and ignorant. There is much Sattva in a sage or saint and there is much more Rajas in a soldier, politician and businessman.

Prakriti is destitute of intelligence. It is like a string of three strands. The three Gunas form the three strands. Prakriti is mere dead matter which is equipped with certain potentialities due to the Gunas.

These three Gunas dominate one's personality and have impact on the overall performance and productivity at workplace. In the recent times the corporate world has taken cognizance of these factors and looks forward for suitable models to train their manpower to extract the best out of them.

An organization where substantial number of people is engaged at work can broadly be divided into two different groups of people, i.e., the Working Group & Managerial Group. A group of people can have different feelings about the working methodology. It may be right or wrong. Let working group be represented by “W”. If they have opinion that working methodology is right, it can be denoted by W(r) and if their opinion about the working methodology is wrong, it is denoted by W (w). Similarly, the person belonging to managerial group can be denoted by “M”. If the opinion of the managerial group about the working methodology is right then it can be denoted by M(r) and if the opinion about the working methodology is wrong, it can be denoted by M(w). The joint impact of these feelings can be expressed in following optional results of four possible combinations. The result is denoted by word R.

a) If managerial group feel that working methodology is right and the working group have also the similar feeling.

Then this can be represented as:

$$\mathbf{M(r) * W(r) = R(r^2) \ldots (1)}$$

Here term R (r^2) represents the output of the Company. Where, r^2 indicates the right option of both groups.

b) If management group feel right, while the working group feel wrong. This can be represented as:

$$M(r) * W(w) = R(r.w) \ldots (2)$$

Where, M(r) i.e., managers opinion about the methodology is right and the opinion of the working group about the working methodology of the company is W (w), then M(r) * W(r) indicates that working methodology is dictatorial.

$$R(r.w) = \text{Dictatorial.}$$

c) When the working group feel that the procedure of working is right, i.e. W(r) while managerial group feels, it's wrong i.e., M (w).

Such type of case is represented by expression as:

$$M(w) * W(r) = R(w.r) \ldots (3)$$

Where R(wr) represents the output, which will have impact of frustration.

d) The last case of working scenario will be when working group feels procedure of working is wrong and the managerial group also feels it to be wrong such situation is represented by:

$$M(w) * W(w) = R(w,w) \ldots (4)$$

The case is of crisis and the system will collapse.

G. SAMKHYA'S GUNA'S IMPACT ON WORKING PROCESS OF AN ORGANISATION

These Guna can be individual or collective. The Gunas of collective group have profound impact on working of organization. These can be evaluated by setting of questions, and computing the result.

The sum of marks, measures the characteristics of Gunas. If the feeling of managerial group is that working procedure is right, then the value M(r) can assume, values depending upon the Gunas of the group.

The **Sattva Guna** denotes that a person has the moral aptitude and has fully dedication upon work and has complete peace and rest.

The **Rajas Guna** denotes that the persons mind is not stable and is flickering.

The **Tamas Guna** denotes that the person at work has a feeling of anxiety and is not able to decide anything. Certain values may be assigned to these gunas according to their characteristics and their significance in a human and social life[13,14].

The Gunas based on, the computations can be assigned as

Sattva = 3

Rajas = 2

Tamas = 1

Working level of organization computed on basis of Samkhya Gunas:-

The working result has been given in equation 1, 2, 3 and 4. The possible final result after the consideration of Samkhya Score can be written as:

$W(r) \quad * M(r) \quad = R(r^2)$

Now, $W(r) = 3, 2, 1$

$M(r) = 3, 2, 1$

When these values are substituted, we can have:

$$R(r^2)_y^x = M(r) \; W(r)$$

Where,

X = Sattva, Rajas, Tamas

Y = Sattva, Rajas, Tamas.

1. When both group feel working process is right:-

The work can be called achievement process, and can assume value as:

$R(r^2)_{Satva}^{Satva} = M(r)_{Satva} \cdot W(r)_{Satva}$

$= 3 \times 3 = 9$

$R(r^2)_{Rajas}^{Satva} = 3 \times 2 = 6$

$R(r^2)_{Tamas}^{Stava} = 3 \times 1 = 3$

$R(r^2)_{Satva}^{Rajas} = 2 \times 3 = 6$

$R(r^2)_{Rajas}^{Rajas} = 2 \times 2 = 4$

$R(r^2)_{Tamas}^{Rajas} = 2 \times 1 = 2$

$R(r^2)_{Satva}^{Tamas} = 1 \times 3 = 3$

$R(r^2)_{Rajas}^{Tamas} = 1 \times 2 = 2$

$R(r^2)_{Tamas}^{Tamas} = 1 \times 1 = 1$

2 When managerial group says procedure is ok and working group says procedure is incorrect:-

One such case, the scenario of work is termed as frustrating. The frustrating values are computed as.

$R(r,w)_{Satva}^{Satva} = 3 \times 3 = 9$

$R(r,w)_{Rajas}^{Satva} = 3 \times 2 = 6$

$R(r,w)_{Tamas}^{Stava} = 3 \times 1 = 3$

$R(r,w)_{Satva}^{Rajas} = 2 \times 3 = 6$

$R(r,w)^{Rajas}_{Rajas} = 2 \times 2 = 4$

$R(r,w)^{Rajas}_{Tamas} = 2 \times 1 = 2$

$R(r,w)^{Tamas}_{Satva} = 1 \times 3 = 3$

$R(r,w)^{Tamas}_{Rajas} = 1 \times 2 = 2$

$R(r,w)^{Tamas}_{Tamas} = 1 \times 1 = 1$

3 when managerial group says procedure is incorrect and working group says procedure is correct:

Such type of atmosphere of the organization is called dictatorial.

The dictatorial levels computed on the basis of Samkhya Gunas are given below:

$R(w, r)^{Satva}_{Satva} = 3 \times 3 = 9$

$R(w, r)^{Satva}_{Rajas} = 3 \times 2 = 6$

$R(w, r)^{Stava}_{Tamas} = 3 \times 1 = 3$

$R(w, r)^{Rajas}_{Satva} = 2 \times 3 = 6$

$R(w, r)^{Rajas}_{Rajas} = 2 \times 2 = 4$

$R(w, r)^{Rajas}_{Tamas} = 2 \times 1 = 2$

$R(w, r)^{Tamas}_{Satva} = 1 \times 3 = 3$

$R(w, r)^{Tamas}_{Rajas} = 1 \times 2 = 2$

$R(w, r)^{Tamas}_{Tamas} = 1 \times 1 = 1$

4 When both-group feels the working procedure is wrong:-

There situation leads to close or shift the organization.

$R\ (w^2)\ )^{Tamas}_{Tamas} = 1x1 = 1$

H. Analysis of Impact:-

There are three state of working.

1 Achievement State of Working: -

In this state of working both the groups feels that working procedure is ok. Then if the Gunas in both groups have sattva guna, the achievement level of the output will be maximum acquiring i.e., 9 level. If there is variation in these Gunas the achievement level of the output will be either 6 or 4. The efforts of the policy maker should be such, that there should not be fall of

Gunas. To limit the Gunas between Sattva and Rajas, celebration, incentive, sports, facilities for traveling and visit of the worker of the organization are to be arranged. Refresher course should often be managed in the organization.

2. The other State of Working is Dictatorial: -

In this case the achievement level of the output falls to as low as 1. This hampers the production but the stability of the organization remains ok.

3 The Third State of Working is Frustration State: -

In this state of working the achievement level of output should be maintained even to its lowest state of output. The lowest value of this state is also 1. This state too has low production and working environment is dissatisfactory. This requires change in the feelings. Creating the atmosphere of confidence in procedure and by explanation and pursuance can do it.

I. CONCLUSION AND SUGGESTIONS:-

Samkhya Gunas of human beings can be broadly applied collectively to groups of persons working in any organization. What it needs is to create an atmosphere of general understanding of good working procedure / design in both the groups, i.e., managerial groups and working groups. If this happens, the Sattva Guna in both groups gives best performance of the system. If Sattva Guna is found missing, efforts should be made to induce the feeling of confidence by pursuing, providing better information, working atmosphere, by providing extra working facilities and motivations.

Suitable training programs in the organizations can attain this concern. Regular assembly of staff to facilitate discussions on their problems and finding solutions can do the trick. Time to time addresses of seniors with motivational approach will help the staff a lot. The staff should be recognized and rewarded publicly. Monitoring the improvements and recharging motivational levels in case of need. From time to time, counseling session may be held for the workers whose level of production is going down and they are getting de-motivated. The satwik motivation forces persons in balancing his mind for doing beneficial work with courage and fearlessness. It also helps him in creating faith in him and in his creator for achieving self dependence, love, co-operation and the feeling of self sacrifice in order to search new horizons of knowledge and truth[15].

J. COMPUTER BASED PROGRAMMED ON ABOVE EQUATIONS

Samakhya Programs

```
#include <stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
 float m_sattva=3,w_sattva,m_rajas=2,w_rajas,m_tamas=1,w_tamas;
 float result1,result2,result3;
 int i;
 clrscr();
 printf("enter the value of i=");
 scanf("%d",&i);
 switch(i)
 {
case 1:
 printf("enter the value of w_sattva=");
 scanf("%f",&w_sattva);
 printf("enter the value of w_rajas=");
 scanf("%f",&w_rajas);
 printf("enter the value of w_tamas=");
 scanf("%f",&w_tamas);

 result1=m_sattva*w_sattva;
 result2=m_sattva*w_rajas;
 result3=m_sattva*w_tamas;
  printf("result= %f,%f,%f",result1,result2,result3);
 break;
 case 2:
 printf("enter the value of w_sattva=");
 scanf("%f",&w_sattva);
```

```
 printf("enter the value of w_rajas=");
 scanf("%f",&w_rajas);
 printf("enter the value of w_tamas=");
 scanf("%f",&w_tamas);
 result1=m_rajas*w_sattva;
 result2=m_rajas*w_rajas;
 result3=m_rajas*w_tamas;
 printf("result= %f,%f,%f",result1,result2,result3);
 break;
case 3:
 printf("enter the value of w_sattva=");
 scanf("%f",&w_sattva);
 printf("enter the value of w_rajas=");
 scanf("%f",&w_rajas);
 printf("enter the value of w_tamas=");
 scanf("%f",&w_tamas);
 result1=m_tamas*w_sattva;
 result2=m_tamas*w_rajas;
 result3=m_tamas*w_tamas;
 printf("\n result= %f, %f, %f",result1,result2,result3);
 break;
default:
printf("i am in default\n");
}
getch();
```

Part III

MOTIVATION AND ITS UNIT

CHAPTER 3

MOTIVATION AND ITS UNIT

A. INTRODUCTION

The word motivation is ubiquitous in the conversations of people such as managers who are in positions of authority. It seems to be used most often in reference to subordinates when they do not live up their managers' expectations and it typically conveys the manager's desire to change the subordinate's behaviour[17].

If we divide the motivation theories in different parts we get the shape as given below[19]:

NEED BASED or CONTENT Theories
- Need hierarchy theory – by Abraham Maslows
- Two – factor theory – by Frederick Herzberg
- ERG – theory - by Clayton Alderfer
- Acquired–Need theory – by David C. Mcclelland

PROCESS / COGNITIVE Theories
- Expectancy Theory – by Victor – H. Vroom
- Equity Theory – by J. Stacy Adams
- Goal Setting Theory – by Locke & latham
- Motivation Model - by Porter Lawler

RE-INFORCEMENT Theories - by B.F. Skinner

BEHAVIROL THEORY
- Theory X & Theory Y – by Douglas Mc Gregor
- Theory Z – by Wrllian Ouchi

NISH-KAM-KARMA (Shrimad Bagwat Gita Philosophy) THEORY - by Lard Kishna

B. Content Theories / Need Based Theories

Maslow's need hierarchy theory, Herzberg's two-factor theory, Alderfer's ERG theory and McClelland's achievement theories are classified as content theories. These theories use individual needs to help in the understanding of job satisfaction and work behaviour. Human needs reflect either physiological or psychological deficiencies. Hunger, for example, is a physiological need; where as desire for emotional support is a psychological need. Needs are an

additional aspects of individual attributes which complement his/her demographic, contemporary, and psychological characteristics[18].

Although content theories disagree somewhat concerning the exact nature of the needs, they do agree that,

Individual needs $\xrightarrow{\text{Activate}}$ tension $\xrightarrow[\text{Influence}]{\text{that}}$ Job satisfaction and work behaviour

Stated more clearly, content theorists suggest that the manager's job is to create a work environment that responds positively to individual needs. Such things as poor performance, undesirable behaviour, and decreased satisfaction can be partially explained in terms of dissatisfaction needs. Also, the motivation value and rewards can be analyzed in terms of 'activated' needs to which a given reward either does or does not respond[19].

Need Hierarchy Theory – by A.H. Maslows

The physiological need- The needs that are usually taken as the starting point for motivation theory are the physiological drives. Two recent lines of research make it necessary to revise our customary notations about these needs, first - the development of the concept of homeostasis, and second, the finding that appetites are a fairly efficient indication of actual needs or lacks in the body[19].

Maslow has pointed out that these physiological drives or needs are to be considered unusual rather than typical because these are isolable; and because these are localizable somatically. In many cases it is possible to demonstrate a localized, underlying somatic base for the drive. This is true less generally than has been thought (exceptions are fatigue, sleepiness, and maternal responses) but it is still true in the classic instances of hunger, sex, and thirst.

It should be pointed out again that any of the physiological needs and the consummatory behavior involved with them serves as channels for all sorts of other needs as well. That is to say that the person who thinks that he is hungry may actually be seeking more for comfort or dependence than for vitamins or proteins. Conversely it is possible to satisfy the hunger need in part by other activities such as drinking water or smoking cigarettes. In other words, relatively isolable as these physiological needs are only relatively isolable and cannot be done completely.

To Maslow, these **physiological needs** are the most preponderant of all needs. What this means specifically is that in the human being who is missing everything in life, it is most likely that the major motivation would be the physiological needs rather than any other. A person who is lacking food, safety, love, and esteem would most probably strive for food more strongly than for anything else. If all the needs are unsatisfied, and the organism is then dominated by the physiological needs, all other needs may be pushed into the background.

At once other (and 'higher') needs emerge and these, rather than physiological hungers, dominate the organism. When these in turn are satisfied, again new (and still 'higher') needs emerge and so on. This is what we mean by saying that the basic human needs are organized in to a hierarchy of relative prepotency.

The Safety needs – If the physiological needs are relatively well gratified, there emerges a new set of needs, which can be categorized roughly the satisfy needs. All that has been said of the physiological needs is equally true, although in lesser degree, of these desires.

The organism may equally well be dominated by these. They may serve as the almost exclusive organizer of behaviour, recruiting all the capacities of the organism in their service, and they may fairly describe the whole organism as a safety seeking mechanism.

The healthy, normal, fortunate adult in our culture is largely satisfied in his safety needs. The peaceful, smooth running, 'good' society ordinarily makes its members feel safe enough from, extremes of temperature, criminals, assault and murder, tyranny, wild animals etc.

Therefore, in a very real sense, he no longer has any safety needs as active motivators. Just as a stuffed man no longer feels hungry, a safe man no longer feels endangered.

The Love and affection Needs- If both the physiological and the safety needs are fairly well gratified, there will emerge the love and affection and belongingness needs, and the whole cycle already described will repeat itself with this new center. Now the person will feel keenly, as never before, the absence of friends, or a sweetheart, or a wife, or children. He will strive for affectionate relations with people in general, namely, for a place in his group, and he will strive with great intensity to achieve this goal. He will want to attain such place more than anything else in this world and may even forget that once, when he was hungry, he sneer (Scorn) at love.

The Esteem Needs- All people in our society have a need or desire for a stable, firmly based, higher evaluation of themselves, for self respect, or self esteem, and for the esteems of others. By firmly based self esteem, we mean that which is soundly based upon real capacity, achievement and respect from others. These needs may be classified in to two subsidiary sets. These are, first, the desire for strength, for achievement, for adequacy, for confidence in the face of the world, and for independence and freedom. Secondly, I have what I can call the desire for reputation or prestige, recognition, attention, importance or appreciation. Satisfaction of the self esteem need leads to feelings of self confidence, worth, strength, capability and adequacy of being useful and necessary in the world.

Need for self – actualization- Even if all these needs are satisfied, we may still often expect that a new discontent and restlessness will soon develop, unless the individual is doing for what he is fitted. A musician must make music, an artist must paint, a poet must write, if he is to be ultimately happy. What a man can be, he must be. This need we may call self- actualization.

These needs vary significantly from person to person. In one individual it may take the form of the desire to be an ideal mother, in another it may be expressed athletically, and in still another it may be expressed in painting pictures or in inventories.

The clear emergence of these needs rests upon prior satisfaction of the physiological, safety, love and esteem needs. We shall call people who are satisfied in these needs, basically satisfied people.

Two – factor theory – by Frederick Herzberg

How do you install a generator in an employee? A brief review of Frederick Herzberg motivation hygiene theory of job attitudes is required. The findings of these studies, along with corroboration from many other investigations using different procedures, suggest that the factors involved in producing job satisfaction (and motivation) are seprate and distinct from the factor that lead to job dissatisfaction. Since separate factor needs to be considered depending on whether job satisfaction or dissatisfaction is being examined, it follows that these two feelings are not opposite to each other. The opposite of job satisfaction is not job dissatisfaction but rather no job satisfaction; and similarly, the opposite of job dissatisfaction is not satisfaction, but no job dissatisfaction[19].

Stating the concept presents a problem in semantics, for we normally think of satisfaction and dissatisfaction as opposite – i.e. what is not satisfying must be dissatisfying and vice versa. But when it comes to understanding the behaviour of people in their jobs more than a play on words is involved.

Two different needs of man are involved here. One set of needs can be thought of as stemming from his animal nature – the built –in drive to avoid pain from the environment, and all the learned drives which becomes conditioned with the basic biological needs. For example, hunger, a basic biological drive makes it necessary to earn money and then money becomes a specific drive. The other set of needs relates to that unique human characteristic, the ability to achieve and, through achievement, to experience psychological growth. The stimuli for the growth needs are tasks that include growth; in the industrial setting they are job content. Country wise, the stimuli including pain – avoidance of behaviour are found in the job environment.

The growth or motivator factors that are intrinsic to the job are: achievement, recognition for achievement, the work itself, responsibility, or advancement. The dissatisfaction – advancement or hygiene factors that are extrinsic to the job include: company policy and administration, supervision, interpersonal relationships, working conditions, salary, status, and security[22].

The motivation – hygiene theory suggest that work can be enriched to bring about effective utilization of personnel. Such a systematic attempt to motivate employees by manipulating the motivator factors is just beginning.

The term job enrichment describes this embryonic movement. In older term, job enlargement, should be avoided because it is associated with past failures stemming from a misunderstanding of the problem.

ERG – theory - by Clayton Alderfer

In 1969, Clayton Alderfer's revision of Abraham Maslow's Hierarchy of Needs, called the ERG Theory appeared in Psychological Review in an article entitled "An Empirical Test of a New Theory of Human Need." Alderfer's contribution to organizational behaviour was dubbed in the form the ERG theory (Existence, Relatedness, and Growth), and was created to align Maslow's

motivation theory more closely with empirical research[20].

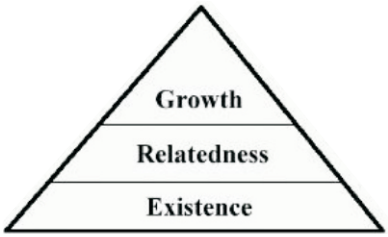
This is a theory of human motivation, formulated by Clayton Alderfer modeled after a similar theory by Abraham Maslow.

ERG theory approaches the question of "what motivates a person to act?" or "Why do we ever do anything?"

The theory assumes that all human activities are motivated by needs. Needs can be divided into three groups of related needs, and these need-groups can be rated according to their importance. The assumption is that humans must meet the need of the most important group before significant attention and energy is devoted to needs in the second group, and must meet the needs of the first and second groups before much energy can be expended on needs in the third group.

The need-groups are:

- Existence needs: Food, water, air, shelter, clothing, safety, physical love and affection.
- Relatedness needs: To be recognized and feel secure as part of a group, a family, a culture
- Growth needs: To progress toward one's ideal self.



These are usually presented in pyramidal form with the most essential needs at the bottom. This illustrates the notion that the structure of human needs must start at the lower, the most essential level, and that higher "structures" can only be achieved when the base is "solid."

This does not mean that one can ignore the lower needs after they have been achieved; one does get hungry again, for instance. Instead it represents life development, in that we work out systems that meet our needs such as these do not require our full attention, thus freeing up energy for higher needs.

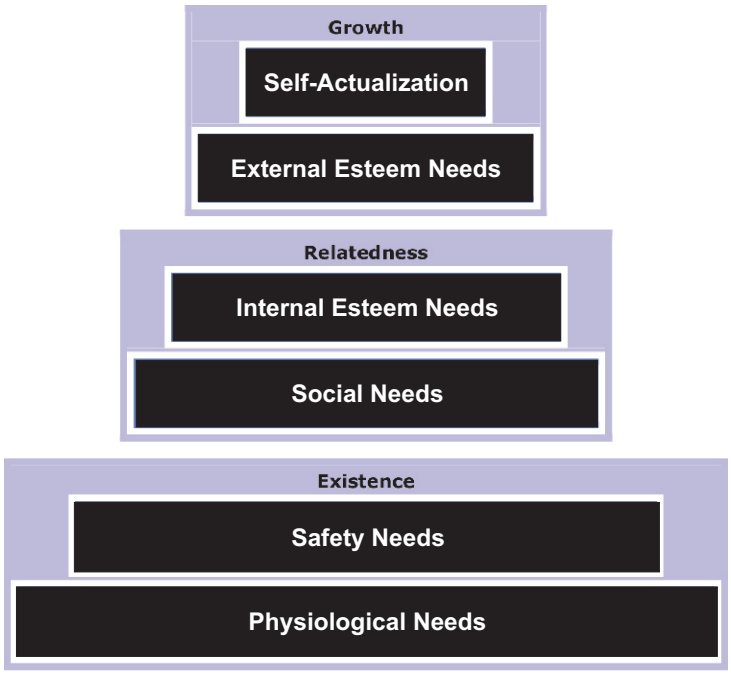
ERG is an acronmy for "Existence, Relatedness and Growth" but it is also the root of the word enERGy. An erg is a unit of energy. It is used in physics to describe the amount of energy that is needed to lift a weight of one gram to the height of one centimeter. Thus a word for "energy" is used as an acronmy for a theory of what energizes people.

One CAN descend the pyramid if one's support structures change then energy must be re-directed to the lower needs even if one has made significant strides toward the upper levels

Similarities to Maslow's Needs Hierarchy

After the original formulation of Maslow's Hierarchy of Needs, studies had shown that the middle levels of Maslow's hierarchy overlap. Alderfer addressed this issue by reducing the number of levels to three. The letters ERG represent these three levels of needs:

- Existence refers to our concern with basic material existence motivators.
- Relatedness refers to the motivation we have for maintaining interpersonal relationships.
- Growth refers to an intrinsic desire for personal development.



Source:http://www.envisionsoftware.com/articles/ERG_Theory.html Date: 12/07/2008; time: 01:30 pm

Like Maslow's model, the ERG motivation is hierarchical, and creates a pyramid or triangle appearance. Existence needs motivation at a more fundamental level than relatedness needs, which, in turn supersedes growth needs[20*].

Acquired – Need theory – by David C. Mcclelland

What makes or motivates a good manager? The question is so enormous in scope that anyone trying to answer it has difficulty knowing where to begin. Some people might say that a good manager is one who is successful; and by now most business researchers and business people themselves know about what motivates people who successfully run their own small business. The key to their success has turned out to be what psychologist call 'the need for achievement', the desire to do something better or more efficient than it has been done before.

But what has achievement motivation got to do with good management? There is no reason on theoretical grounds why a person who has a strong desire to be more efficient should make a good manager.

For one thing, because they focus on personal improvement, on doing things better by themselves, achievement-motivated people want to do things themselves. For another, they want concrete short – term feedback on their performances so that they might tell how well they are doing. Yet a manager particularly one of or, in a large complex organization cannot perform the entire task necessary for the success by his or her own. Manager must manage others so that they might do things for the organization. Also, feedback on subordinates' performances may be a lot vaguer and more delayed than it would be if they were doing everything themselves.

The manager's job seems to call more for people who can influence others than for those who do things better on their own. In motivational terms, we might expect the successful manager to have a greater 'need for power' than need to achieve. But there must be other qualities besides the need for power that goes into the makeup of a good manager.

The general conclusion of this study is that the top manager of a company must possess a high need for power that has a concern for influencing people. However, this need must be disciplined and controlled so that it might be directed towards the benefit of the institution as a whole and not toward the manager's personal aggrandizement. Moreover top managers' need for power ought to be greater than their need for being liked by people.

Comparison of Maslow- Herzberg- ERG Theory & Acquired Need Theory

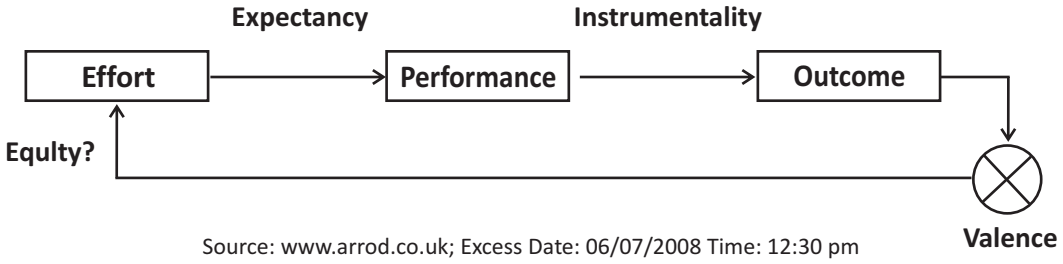
<table>
<tr><th>Maslow's need hierarchy theory</th><th>Herzberg's two-factor theory</th><th>Alderfer's ERG theory</th><th>McClelland's achievement theory</th></tr>
<tr><td rowspan="3">1. Self –Actualisation need
2. Ego needs
3. Social needs
4. Safety needs
5. Physiological needs</td><td>Motivators</td><td>Growth Needs</td><td>Need for Achievement and Power</td></tr>
<tr><td rowspan="2">Hygiene factors</td><td rowspan="2">Relatedness Needs</td><td>Need for Affiliation</td></tr>
<tr><td></td></tr>
<tr><td></td><td></td><td>Existence Needs</td><td></td></tr>
</table>

C. COG0NITIVE / PROCESS THEORY

In recent years, a substantially different approach to understanding motivation has emerged. This approach includes a number of process theories that view motivation as an individual's decisions to act so as to put forth some given level of effort. There are three such theories, namely, expectancy theory, equity theory, and performance- satisfaction model.

Expectancy Theory – by Victor – H. Vroom

The expectancy theory of motivation is suggested by Victor Vroom. Unlike Maslow and Herzberg, Vroom does not concentrate on needs but rather focuses on outcomes[20].



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Whereas Maslow and Herzberg look at the relationship between internal needs and the resulting efforts expended to fulfil them, Vroom separates effort (which arises from motivation), performance and outcomes.

Vroom, hypothesizes that in order for a person to be motivated that effort, performance and motivation must be linked together. He proposes three variables to account for this, which he calls Valence, Expectancy and Instrumentality.

Expectancy is the belief that increases effort will lead to increase performance i.e. if I work harder then it will be better. This is affected by such things as:

- Having the right resources available (e.g. raw materials, time)
- Having the right skills to do the job
- Having the necessary support to get the job done (e.g. supervisor support, or correct information on the job)

Instrumentality is the belief that if you perform well a valued outcome will be received i.e. if I do a good job there is something in it for me. This is affected by such things as:

- Clear understanding of the relationship between performance and outcomes – e.g. the rules of the reward 'game'
- Trust in the people who will take the decisions on who gets what outcome
- Transparency of the process that decides who gets what outcome

Valence has the importance that the individual places upon the expected outcome. For example, if I am mainly motivated by money, I might not value offers of additional time off.

Having examined these links, the idea is that the individual changes their level of effort according to the value they place on the outcomes they receive from the process and on their perception of the strength of the links between effort and outcome.

So, if I perceive that any one of these is true:

- My increased effort will not increase my performance
- My increased performance will not increase my rewards
- I don't value the rewards on offer

...then Vroom's expectancy theory suggests that this individual would not be motivated. This means that even if an organisation achieves two out of three, that employees would still not be motivated, all three are required for positive motivation.

Here there is also a useful link to the Equity theory of motivation: mainly those people will

also compare outcomes for themselves with others. Equity theory suggests that people will alter the level of effort they put in to make it fair as compared to others according to their perceptions. So if we got the same raise this year but I think you put in a lot less effort, this theory suggests that I would scale back the effort I put in.

Crucially Expectancy theory works on perceptions – so even if an employer thinks they have provided everything appropriate for motivation and even if this works with most people in that organization it doesn't mean that someone won't perceive that it doesn't work for them.

At first glance this theory would seem most applicable to a traditional-attitude work situation where how to motivate the employee depends on whether they want the reward on offer for doing a good job or they believe that more effort will lead to that reward.

However, it could equally be applied to any situation where someone does something because they expect a certain outcome. For example, I recycle paper because I think it's importance to conserve resources and take a stand on environmental issues (valence); I think that the more effort I put into recycling the more paper I will recycle (expectancy); and I think that the more paper I recycle then less resources will be used (instrumentality)

Thus this theory of motivation is not about self-interest in rewards but about the associations people make towards expected outcomes and the contribution they feel they can make towards those outcomes.

Other theories, in my opinion, do not allow for the same degree of individuality between people. This model takes into account individual perceptions and thus personal histories, allowing a richness of response not obvious in Maslow or McClelland, which assumes that people are essentially all the same.

Expectancy theory could also be overlaid on another theory (e.g. Maslow). Maslow could be used to describe which outcomes people are motivated by and Vroom to describe whether they will act based upon their experience and expectations.

Equity Theory – by J. Stacy Adams

John Stacey Adams, a workplace and behavioural psychologist, put forward his Equity Theory on job motivation in 1963. There are similarities with Charles Handy's extension and interpretation of previous simpler theories of Maslow, Herzberg and other pioneers of workplace psychology, In it the theory acknowledges the subtle and variable factors affect each individual's assessment and perception of their relationship with their work, and thereby their employer. However, awareness and cognizance of the wider situation - and crucially comparison - feature more strongly in Equity Theory than in many other earlier motivational models[23].

The Adams' Equity Theory model therefore extends beyond the individual self, and incorporates influence and comparison of other people's situations - for example colleagues and friends - in forming a comparative view and awareness of Equity, which commonly manifests as a sense of what fair is.

When people feel fairly or advantageously treated they are more likely to be motivated; when they feel unfairly treated they are highly prone to feelings of disaffection and demotivation. The way that people measure this sense of fairness is at the heart of Equity Theory.

Equity, and thereby the motivational situation we might seek to assess using the model, is not dependent on the extent to which a person believes reward exceeds effort, nor even necessarily on the belief that reward exceeds effort at all. Rather, Equity, and the sense of fairness which commonly underpins motivation, is dependent on the comparison a person makes between his or here reward/investment ratio with the ratio enjoyed (or suffered) by others considered to be in a similar situation.

Adams' equity theory

Adams called personal efforts and rewards and other similar 'give and take' issues at work respectively 'inputs' and 'outputs'.

Inputs are logically what we give or put into our work. Outputs are everything we take out in return.

These terms emphasise that what people put into their work includes many factors besides working hours, and that what people receive from their work includes many things aside from money.

Adams used the term 'referent' others to describe the reference points or people with whom we compare our own situation, which is the pivotal part of the theory.

Adams Equity Theory goes beyond - and is quite different from merely assessing effort and reward. Equity Theory adds a crucial additional perspective of comparison with 'referent' others (people we consider in a similar situation).

Equity theory thus helps explain why pay and conditions alone do not determine motivation.

In terms of how the theory applies to work and management, we each seek a fair balance between what we put into our job and what we get out of it. But how do we decide what is a fair balance?

The answer lies in Equity Theory. Importantly we arrive at our measure of fairness - Equity - by comparing our balance of effort and reward, and other factors of give and take - the ratio of input and output - with the balance or ratio enjoyed by other people, whom we deem to be relevant reference points or examples ('referent' others).

Crucially this means that Equity does not depend on our input-to-output ratio alone - it depends on our comparison between our ratio and the ratio of others.

We form perceptions of what constitutes a fair ratio (a balance or trade) of inputs and outputs by comparing our own situation with other 'referents' (reference points or examples) in the market place as we see it.

In practice this helps to explain why people are so strongly affected by the situations (and views and gossip) of colleagues, friends, partners etc., in establishing their own personal sense of

fairness or equity in their work situations.

Adams' Equity Theory is therefore a far more complex and sophisticated motivational model than merely assessing effort (inputs) and reward (outputs).

The actual sense of equity or fairness (or inequity or unfairness) within Equity Theory is arrived at only after incorporating a comparison between our own input and output ratio with the input and output ratios that we see or believe to be experienced or enjoyed by others in similar situations.

This comparative aspect of Equity Theory provides a far more fluid and dynamic appreciation of motivation than typically arised in motivational theories and models based on individual circumstance alone.

For example, Equity Theory explains why people can be happy and motivated by their situation one day, and yet with no change to their terms and working conditions can be made very unhappy and demotivated, if they learn for example that a colleague (or worse an entire group) is enjoying a better reward-to-effort ratio.

It also explains why giving one person a promotion or pay-rise can have a demotivating effect on others.

Note also, importantly, that what matters is the ratio, not the amount of effort or reward pay-rise. This explains for example why and how full-time employees will compare their situations and input-to-output ratios with part-time colleagues, who very probably earn less, however it is the ratio of input-to-output - reward-to-effort - which counts, and if the part-timer is perceived to enjoy a more advantageous ratio, then so this will have a negative effect on the full-timer's sense of Equity, and with it their personal motivation.

Inputs	**Equity** dependent on comparing own ratio of input/output with ratios of 'referent' others	**Outputs**
Inputs are typically: effort, loyalty, hard work, commitment, skill, ability, adaptability, flexibility, tolerance, determination, heart and soul, enthusiasm, trust in our boss and superiors, support of colleagues and subordinates, personal sacrifice, etc.	People need to feel that there is a fair balance between inputs and outputs. Crucially fairness is measured by comparing one's own balance or ratio between inputs and outputs, with the ratio enjoyed or endured by relevant ('referent') others.	Outputs are typically all financial rewards - pay, salary, expenses, perks, benefits, pension arrangements, bonus and commission - plus intangibles - recognition, reputation, praise and thanks, interest, responsibility, stimulus, travel, training, development, sense of achievement and advancement, promotion, etc.

Remember also that words like efforts and rewards, or work and pay, are an over-simplification - hence Adams' use of the terms inputs and outputs, which more aptly cover all aspects of what a person gives, sacrifices, tolerates, invests, etc., into their work situation, and all aspects of what a person receives and benefits from in their work and wider career, as they see it.

If we feel that inputs are fairly rewarded by outputs (the fairness benchmark being subjectively perceived from market norms and other comparable references) generally we are happier in our work and more motivated to continue inputting at the same level[24].

If we feel that our ratio of inputs to outputs is less beneficial than the ratio enjoyed by referent others, we become de-motivated in relation to our job and employer. People respond to a feeling of inequity in different ways.

Generally the extent of de-motivation is proportional to the perceived disparity with other people or inequity, but for some people just the smallest indication of negative disparity between their situation and other people's is enough to cause massive disappointment and a feeling of considerable injustice, resulting in de-motivation, or worse, open hostility.

Some people reduce effort and application and become inwardly disgruntled, or outwardly difficult, recalcitrant or even disruptive. Other people seek to improve the outputs by making claims or demands for more reward, or seeking an alternative job.

Understanding Equity Theory - and especially its pivotal comparative aspect - helps managers and policy-makers to appreciate that while improving one person's terms and conditions can resolve that individual's demands (for a while), if the change is perceived by other people to upset the Equity of their own situations then the solution can easily generate far more problems than it attempted to fix.

Equity Theory reminds us that people see themselves and crucially the way that they are treated in terms of their surrounding environment, team, system, etc - not in isolation - so they must be managed and treated accordingly.

Goal Setting Theory – by Locke & Latham

Understanding SMART Goal Setting

Goal setting is a powerful way of motivating people. The value of goal setting is so well recognized that entire management systems, like **Management by Objectives**, have a goal setting basics, incorporated within them.

In fact, goal setting theory is generally accepted as among the most valid and useful motivation theories in industrial and organizational psychology, human resource management, and organizational behavior.

Many of us have learned - from bosses, seminars, and business articles - to set SMART goals. It seems naturally to assume that by setting a goal that's Specific, Measurable, Attainable, Relevant, and Time-bound, we will be well on our way to accomplishing it.

But is this really the best way of setting goals

To answer this, we look to Dr Edwin Locke's pioneering research on goal setting and motivation in the late 1960s. In his 1968 article "Toward a Theory of Task Motivation and Incentives," he stated that employees were motivated by clear goals and appropriate feedback. Locke went on to say that working toward a goal provided a major source of motivation to actually

reach the goal - which, in turn, improved performance.

This information does not seem revolutionary to most of us some 40 years later. This shows the impact of his theory has had on professional and personal performance.

Goal Setting Theory

Locke's work showed that there was a relationship between a difficult specific goal and people's performance towards that of a task. He found that specific and difficult goals led to better task performance than vague or easy goals.

Telling someone to "Try hard" or "Do your best" is less effective than "Try to get more than 80% correct" or "Concentrate on beating your best time." Likewise, having a goal that's too easy is not a motivating force. Hard goals are more motivating than easy goals, because it's much more of an accomplishment to achieve something that you have to work for.

A few years after Locke published his article, another researcher, Dr Gary Latham, studied the effect of goal setting in the workplace. His results supported exactly what Locke had found, and the inseparable link between goal setting and workplace performance was formed.

In 1990, Locke and Latham published their seminal work, "A Theory of Goal Setting and Task Performance." In this book, they reinforced the need to set specific and difficult goals, and they outlined three other characteristics of successful goal setting.

Five Principles of Goal Setting

To motivate, goals must take into consideration the degree to which each of the following exists:

1. Clarity.
2. Challenge.
3. Commitment.
4. Feedback.
5. Task complexity.

Let's look at each of these in detail.

Clarity - Clear goals are measurable, unambiguous, and behavioral. When a goal is clear and specific, with a definite time set for completion, there is less misunderstanding about what behaviors will be rewarded. You know what's expected, and you can use the specific result as a source of motivation. When a goal is vague - or when it's expressed as a general instruction, like "Take initiative" - it has limited motivational value.

To improve you or your team's performance, set clear goals that use specific and measurable standards. "Reduce job turnover by 15%" or "Respond to employee suggestions within 48 hours" are examples of clear goals. When you use the SMART acronym to help you set goals, you ensure the clarity of the goal by making it Specific, Measurable and Time-bound.

Challenge - One of the most important characteristics of goals is the level of challenge. People are

often motivated by achievement, and they'll judge a goal, based on the significance of the anticipated accomplishment. When you know that what you do will be well received, there's a natural motivation to do a good job. Rewards typically increase for more difficult goals. If you believe you'll be well compensated or otherwise rewarded for achieving a challenging goal that will boost your enthusiasm and your drive to get it done.

Setting “SMART” goals that are relevant links closely to the rewards given for achieving challenging goals. Relevant goals will further the aims of your organization, and these are the kinds of goals that most employers will be happy to reward. When setting goals make each goals a challenge. If an assignment is easy and not viewed as very important - and if you or your employee doesn't expect the accomplishment to be significant, the effort may not be impressive.

Commitment - Goals must be understood and agreed upon if they are to be effective. Employees are more likely to "buy into" a goal if they feel they were part of creating that goal. The notion of participative management rests on this idea of involving employees in setting goals and making decisions. One version of SMART - for use when you are working with someone else to set their goals - has A and R stand for Agreed and Realistic instead of Attainable and Relevant. Agreed goals lead to commitment.

This doesn't mean that every goal has to be negotiated with and approved by employees. It does mean that goals should be consistent and in line with previous expectations and organizational concerns. As long as the employee believes the goal is consistent with the goals of the company, and believes the person assigning the goal is credible, then the commitment should be there.

Interestingly, goal commitment and difficulty often work together. The harder the goal, the more commitment is required. If you have an easy goal, you don't need a lot of motivation to get it done. When you're working on a difficult assignment, you will likely encounter challenges that require a deeper source of inspiration and incentive.

As you use goal setting in your workplace, make an appropriate effort to include people in their own goal setting. Encourage employees to develop their own goals, and keep them informed about what's happening elsewhere in the organization. This way, they can be sure that their goals are consistent with the overall vision and purpose that the company seeks.

Feedback - In addition to selecting the right type of goal, an effective goal program must also include feedback. Feedback provides opportunities to clarify expectations, adjust goal difficulty, and gain recognition. It's important to provide benchmark opportunities or targets, so individuals can determine for themselves how they're doing.

These regular progress reports, which measure specific success along the way, are particularly important where it's going to take a long time to reach a goal. In these cases, break down the goals into smaller chunks, and link feedback to these intermediate milestones. SMART goals are Measurable, and this ensures that clear feedback is possible.

With all your goal setting efforts, make sure that you build in time for providing formal

feedback. Certainly, informal check-ins are important, and they provide a means of giving regular encouragement and recognition. However, taking the time to sit down and discuss goal performance is a necessary factor in long-term performance improvement.

Task Complexity - The last factor in goal setting theory introduces two more requirements for success. For goals or assignments that are highly complex, take special care to ensure that the work doesn't become too overwhelming.

People who work in complicated and demanding roles probably have a high level of motivation already. However, they can often push themselves too hard if measures aren't built into the goal expectations to account for the complexity of the task. It's therefore important to do the following:

- Give the person sufficient time to meet the goal or improve performance.
- Provide enough time for the person to practice or learn what is expected and required for success.

The whole point of goal setting is to facilitate success. Therefore, you want to make sure that the conditions surrounding the goals don't frustrate or inhibit people from accomplishing their objectives. This reinforces the "Attainable" part of SMART.

D. RE-INFORCEMENT THEORY - by B.F. Skinner

Why do people behave as they do? It was probably first a practical question: How could a person anticipate and hence prepare for what another person would do? Later it would become practical in another sense: How could another person be induced to behave in a given way? Eventually it becomes a matter of understanding and explaining behaviour. It could always be reduced to a question about causes.

We tend to say, often rashly, that one thing follows another, it was probable another, it was probably caused by it – following the ancient principle of post hoc, ergo propter hoc (after this, therefore because of this). Of many examples to be found in the explanation of human behaviour, one is especially important here. The person with whom we are most familiar is our self; many of the things we observe just before we behave occur within our body, and it is easy to take them as the cause of our behaviour. If we are asked why we have spoken sharply to a friend, we may reply, 'Because I felt angry.' It is true that we felt angry before, or as, we spoke, and so we take our anger to be the cause of our remark. Asked why we are not eating our dinner, we may say, 'because I do not feel hungry.' We often feel hungry when we eat and hence conclude that we eat because we feel hungry. I have behaved in such and such a way. Feelings occur at just the right time to serve as cause of behaviour, and they have been cited as such for countries. We assume that other people feel as we feel when they behave as we behave.

But where are these feelings and state of mind? Of what stuff are they made? The traditional answer is that they are located in a word of non – physical dimensions called the mind and they are mental. But another question then arises: How can mental events cause or be caused

by a physical one? If we want to predict what a person will do, how can we discover the mental cause if his behaviour, and how can we produce the feelings and state of mind which will induce him to behave in a given way?

It is possible to believe that behaviour express feelings, to anticipate what a person will do by guessing or asking him how he feels, and to change the environment in the hope of changing feelings while paying little if any attention to theoretical problems. Those who are not quite comfortable about such a strategy sometimes take refuge in physiology. The theory of knowledge called physicalism holds that when we introspect or have feelings we are looking at states or activities of our brain. But the major difficulties are practical: we cannot anticipate what a person will do by looking directly at his feelings or his nervous system, nor can we change his behaviour by changing his mind or his brain. But in any cases we seem to be no worse off for ignoring philosophical problems.

The mentalistics problem can be avoided by going directly to the prior physical causes while bypassing intermediate feeling or states of mind. The quickest way to do this is to confine oneself to what an early behaviourist, Max Meyer, called the 'psychology of the other one': consider only those facts which can be objectively observed in the behaviour of one person in its relation to his prior environmental history. If certain ways of teaching a person lead to notice very small differences in his 'sensations', and if because he sees these differences he can classify colored objects correctly, then it should follow that we can use these way of teaching him to classify objects correctly.

There is, of course, nothing new in trying to predict or control behaviour by observing or manipulating prior public events.

Mentalistic explanations allay curiosity and bring inquiry to a stop. It is so easy to observe feelings and states of mind at a time and in a place which make them seem like causes that we are not inclined to inquire further.

Methodological behaviorism might be thought of as a psychological version of logical positivism or operationalism, but they are concerned with different issues.

Mentalism kept attention away from the external antecedent events which might have explained behaviour, by seeming to supply an alternative explanation. Methodological behaviour did just the reverse: by dealing exclusively with external antecedent events it turned attention away from self – observation and self knowledge. Radical behaviorism restores some kind of balance. It does not insist upon truth by agreement and can therefore consider events taking place in the private world within the skin.

The behaviour of an individual, therefore, is not motivated by his inner needs and desires but by the external environment. People perform task that had earlier led to desirable outcomes and avoid performing tasks that had led to undesirable outcomes. The future behaviour is, thus, a reinforcement of the past outcomes.

In any organization managers motivate their employees by creating an effective work

environment and praising their good performance so that they repeat the performance in future also. Even in case of poor performance, managers do not straightway condemn them; rather, they explain the reason for poor performance and motivate them to perform better in future. Any action of condemnation by managers is likely to result in employee frustration and the behaviour not being repeated in future, howsoever important it may be for organizations. The managers must, therefore, solve the problem that workers face in their work environment and resort to means like effective communication and feedback of performance to reinforce the employee behaviour.

Four kind of reinforcement can result from employees' behaviour –

1. Positive reinforcement

If the managers want the employees' behaviour to be repeated, they will use positive rein forcers like rewards and praise. When the managers offer praise or pay rise for a desired behaviour, it serves to positively reinforce that behaviour in future also. A positive reinforcement is, therefore, a method of strengthening behaviour by offering reward for good performance.

2. Negative Reinforcement

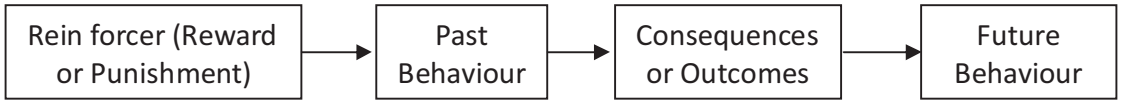
The managers reinforce the specific behaviour by avoiding or eliminating the outcomes that the employees feel are undesirable. If the employees do not wish to reprimand in front of others for performing a negative behaviour, the managers should explain to them the reasons for their failure when they are alone rather than doing the same in front of their co-workers.

3. Extinct reinforcement

Specific behaviour, which a manager does not want to be repeated in future, will either be ignored by them or straightaway condemned. Employees normally do not repeat behaviour which is followed by negative outcomes or no outcomes. Extinction is, thus, used to weaken the behaviour.

4. Punishment

This also aims at weakening the strength of behaviour. An employee for example, who takes up a fight with his co-workers or comes to office late every day, will be punished by his managers, say, by deducting his one day's salary. This action of manager is a sufficient indication to the employee that he or she should never take up a tight with anyone or come late to the office.



E. Behavioural Theories

The nature of individuals and how they behave in a particular situation forms the basis for motivating them in the behavioral theory. The two important theories that deals with the human behaviour have discussed below:

Theory X & Theory Y – by Mc Gregor

Douglas McGregor proposed two distinct views of human beings: one basically negative,

labeled Theory X, and the other basically positive, labled Theory Y. After viewing the way in which managers dealt with employees, McGregor concluded that managers' view of the nature of human beings are based on a certain grouping of assumptions and that they tend to mold their behaviour towards employees according to these assumptions.

Under Theory X, the four assumptions held by managers are:

1. Employ inherently dislike work and, whenever possible, will attempt to avoid it.
2. Since employees dislike work, they must be coerced, controlled, or threatened with punishment to achieve goals.
3. Employees will avoid responsibilities and seek formal direction whenever possible.
4. Most workers place security above all other factors associated with work and will display little ambition.

In contrast to these negative views about the nature of human beings McGregor listed the four positive assumptions that he called Theory Y.

1. Employees can view work as being as natural as rest or play.
2. People will exercise self-direction and self-control if they are commited to the objectives.
3. The average person can learn to accept, even seek, responsibility.
4. The ability to make innovative decisions is widely dispersed throughout the population and is not necessarily the sole province of those in management positions.

What are the motivational implications if you accept McGregor's analysis? The answer is best expressed in the framework presented by Maslow. Theory X assumes that lower order needs dominates individuals. Theory Y assume that higher –order needs dominates individuals. McGregor himself held to the belief that Theory Y assumptions were more valid than Theory X. therefore, he proposed such ideas as participative decision making, responsible and challenging jobs, and good relation as approaches that would maximize an employees' job motivation.

Unfortunately, there is no evidence to conform that either set of assumptions is valid or that accepting Theory Y assumptions and altering one's actions accordingly will lead to more motivated workers. Organisational Behaviour theories need to have empirical support for us to accept them. Similarly to the hierarchy of needs theories, such empirical support is lkacking for Theory X and Theory Y.

Theory Z – by Ouchi

Theory Z is not a Mcgregor idea and as such is not Mcgregor's extension of his XY theory Theory Z was not developed by Mcgregor, but by William Ouchi, in his book 1981 'Theory Z: How American management can meet the Japanese Challenge'. William Ouchi is professor of management at UCLA, Los Angeles, and a board member of several large US organisations.

Theory Z is often referred to as the 'Japanese' management style, which is essentially what

it is. It's interesting that Ouchi chose to name his model 'Theory Z', which apart from anything else tends to give the impression that it's a Mcgregor idea. One wonders if the idea was not considered strong enough to stand alone with a completely new name... Nevertheless, Theory Z essentially advocates a combination of all that's best about theory Y and modern Japanese management, which places a large amount of freedom and trusts with workers, and assumes that workers have a strong loyalty and interest in team-working and the organisation.

Theory Z also places more reliance on the attitude and responsibilities of the workers, whereas Mcgregor's XY theory is mainly focused on management and motivation from the manager's and organisation's perspective.

There is no doubt that Ouchi's Theory Z model offers excellent ideas, albeit it lacking the simple elegance of Mcgregor's model, which let's face it, thousands of organizations and managers around the world have still yet to embrace. For this reason, Theory Z may for some be like trying to manage the kitchen at the Ritz before mastering the ability to cook a decent fried breakfast.

Ouchi's Theory Z makes certain assumptions about workers. These include the assumption that workers tend to want to build cooperative and intimate working relationships with those that they work for and with, as well as the people that work for them.

Also, Theory Z workers have a high need to be supported by the company, and highly value a working environment in which such things as family, cultures and traditions, and social institutions are regarded as equally important as the work itself. These types of workers have a very well developed sense of order, discipline, and moral obligation to work hard, and a sense of cohesion with their fellow workers.

Finally, Theory Z workers, it is assumed, can be trusted to do their jobs to their utmost ability, so long as management can be trusted to support them and look out for their well being.

One of the most important tenets of this theory is that management must have a high degree of confidence in its workers in order for this type of participative management to work. For this to work, employees must be very knowledgeable about the various issues of the company, as well as possessing the competence to make informed decisions.

Theory Z stresses the need for enabling workers to become generalists, rather than specialists, and to increase their knowledge of the company and its processes through job rotations and continual training. In fact, promotions tend to be slower in this type of setting, as workers are given a much longer opportunity to receive training, and more time to learn the intricacies of the company's operations.

The desire, under this theory, is to develop a work force that has more of a loyalty towards staying with the company for an entire career, and be more permanent than in other types of settings. It is expected that once an employee does rise to a position of high level management, they will know a great deal more about the company and how it operates, and will be able to use Theory Z management theories effectively on the newer employees.

While several similarities and differences surround the ideas of McGregor and Ouchi, the most obvious comparison is that they both deal with perceptions and assumptions about people. These perceptions tend to take the form of how management views employees, while Ouchi's Theory Z takes this notion of perceptions a bit farther and talks about how the workers might perceive management.

F. NISH-KAM-KARMA (Shrimad Bagwat Gita Philosophy) THEORY - By Lord Kishna

There is an important distinction between effectiveness and efficiency in managing. Effectiveness is doing the right things and Efficiency is doing things right. The general principles of effective management can be applied in every fields the differences being mainly in the application than in principles. Again, effective management is not limited in its application only to business or industrial enterprises but to all organizations where the aim is to reach a given goal through a Chief Executive or a Manager with the help of a group of workers[3].

The Manager's functions can be briefly summed up as under:

- Forming a vision and planning the strategy to realize such vision.
- Cultivating the art of leadership.
- Establishing the institutional excellence and building an innovative organization.
- Developing human resources.
- Team building and teamwork.
- Delegation, motivation, and communication and Reviewing performance and taking corrective steps whenever called for.

Thus Management is a process in search of excellence to align people and get them committed to work for a common goal to the maximum social benefit. The critical question in every Manager's mind is how to be effective in his job. The answer to this fundamental question is found in the Bhagavad Gita which repeatedly proclaims that 'you try to manage yourself'. The reason is that unless the Manager reaches a level of excellence and effectiveness that sets him apart from the others whom he is managing, he will be merely a face in the crowd and not an achiever.

In this context the Bhagavad Gita expounded thousands of years ago by the Super Management Guru Bhagawan Sri Krishna enlightens us on all managerial techniques leading to a harmonious and blissful state of affairs as against conflicts, tensions, lowest efficiency and least productivity, absence of motivation and lack of work culture etc common to most of the Indian enterprises today[4,5].

The modern management concepts like vision, leadership, motivation, excellence in work, achieving goals, meaning of work, attitude towards work, nature of individual, decision making, planning etc., are all discussed in the Bhagavad Gita with a sharp insight and finest analysis to drive through our confused grey matter making it highly eligible to become a part of the modem management syllabus.

It may be noted that while Western design on management deals with the problems at

superficial, material, external and peripheral levels, the ideas contained in the Bhagavad Gita tackle the issues from the grass roots level of human thinking because once the basic thinking of man is improved it will automatically enhance the quality of his actions and their results.

The management thoughts emanating from the Western countries particularly the U.S.A. are based mostly on the lure for materialism and a perennial thirst for profit irrespective of the quality of the means adopted to achieve that goal. This phenomenon has its source in abundance in the West particularly the U.S.A. Management by materialism caught the fancy of all the countries the world over, India being no exception to this trend.

Bhagavad Gita and Managerial Effectiveness now let us re-examine some of the modern management concepts in the light of the Bhagavad Gita which is a primer of management by values. Motivation is shown in figure.

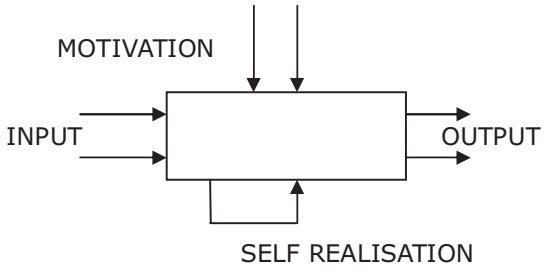


Figure: Working Process and Motivation

Utilization of Available Resources

The first lesson in the management science is to choose wisely and utilize optimally the scarce resources if one has to succeed in his venture. During the curtain raiser before the Mahabharata War Duryodhana chose Sri Krishna's large army for his help while Arjuna selected Sri Krishna's wisdom for his support. This episode gives us a clue as to who is an Effective Manager[25].

Attitude towards Work

Three stone-cutters were engaged in erecting a temple. As usual a H.R.D. Consultant asked them what they were doing. The response of the three workers to this innocent-looking question is illuminating.

'I am a poor man. I have to maintain my family. I am making a living here,' said the first stone-cutter with a dejected face.

'Well, I work because I want to show that I am the best stone-cutter in the country,' said the second one with a sense of pride.

'Oh, I want to build the most beautiful temple in the country,' said the third one with a visionary gleam.

Their jobs were identical but their perspectives were different. What Gita tells us is to develop the visionary perspective in the work we do. It tells us to develop a sense of larger vision in

one's work for the common good.

One of the greatest contributions of India to the world is Holy Gita. Arjuna got mentally depressed when he saw his relatives with whom he has to fight. To motivate him the Bhagavad Gita is preached in the battle field Kurukshetra by Lord Krishna to Arjuna as counseling to do his duty while multitudes of men stood by waiting. It has got all the management tactics to achieve the mental equilibrium and to overcome any crisis situation.

The Bhagavad Gita can be experienced as a powerful catalyst for transformation. Bhagavad gita means song of the Spirit, song of the Lord. The Holy Gita has become a secret driving force behind the enfoldment of one's life. In the days of doubt this divine book will support all spiritual searches. This divine book will contribute to self reflection, finer feeling and deepen one's inner process. Then life in the world can become a real education, dynamic, full and joyful, no matter what the circumstance.

May the wisdom of loving consciousness ever guide us on our journey What makes the Holy Gita a practical psychology of transformation is that it offers us the tools to connect with our deepest intangible essence and we must learn to participate in the battle of life with right knowledge

Mind can be one's friend or enemy. Mind is the cause for both bondage and liberation. The word mind is derived from man to think and the word man derived from Manu (Sanskrit word for man).

"The Supreme Lord is situated in everyone's heart, O Arjuna, and is directing the wanderings of all living entities, who are seated as on a machine, made of the material energy."

There is no theory to be internalized and applied in this psychology. Ancient practices spontaneously induce what each person needs as the individual and the universal coincide. The work proceeds through intellectual knowledge of the playing field (jnana yoga), emotional devotion to the ideal (bhakti yoga) and right action that include both feeling and knowledge (karma yoga). With ongoing purification we approach wisdom.

The Bhagavad Gita is a message addressed to each and every human individual to help him or her to solve the vexing problem of overcoming the present and progressing towards a bright future. Within its eighteen chapters is revealed a human drama. This is the experience of everyone in this world, the drama of the ascent of man from a state of utter dejection, sorrow and total breakdown and hopelessness to a state of perfect understanding, clarity, renewed strength and triumph.

Management has become a part and parcel of everyday life, be it at home, in the office or factory and in Government. In all organizations, where a group of human beings assemble for a common purpose, management principles come into play through the management of resources, finance and planning, priorities, policies and practice. Management is a systematic way of carrying out activities in any field of human effort.

Its task is to make people capable of joint performance, to make their weaknesses

irrelevant, says the Management Guru Peter Drucker. It creates harmony in working together - equilibrium in thoughts and actions, goals and achievements, plans and performance, products and markets. It resolves situations of scarcity, be they in the physical, technical or human fields, through maximum utilization with the minimum available processes to achieve the goal. Lack of management causes disorder, confusion, wastage, delay, destruction and even depression. Managing men, money and materials in the best possible way, according to circumstances and environment, is the most important and essential factor for a successful management. Management guidelines from the Bhagavad Gita There is an important distinction between effectiveness and efficiency in managing.

1. Effectiveness is doing the right things.
2. Efficiency is doing things right.

The general principles of effective management can be applied in every field, the differences being more in application than in principle. The Manager's functions can be summed up as:

- Forming a vision.
- Planning the strategy to realize the vision.
- Cultivating the art of leadership.
- Establishing institutional excellence.
- Building an innovative organization.
- Developing human resources.
- Building teams and teamwork.
- Delegation, motivation, and communication.

Reviewing performance and taking corrective steps when called for.

Thus, management is a process of aligning people and getting them committed to work for a common goal to the maximum social benefit - in search of excellence.

The critical question in all managers' minds is how to be effective in their job. The answer to this fundamental question is found in the Bhagavad Gita, which repeatedly proclaims that `you must try to manage yourself.' The reason is that unless a manager reaches a level of excellence and effectiveness, he or she will be merely a face in the crowd. Old truths in a new context

The Bhagavad Gita, written thousands of years ago, enlightens us on all managerial techniques leading us towards a harmonious and blissful state of affairs in place of the conflict, tensions, poor productivity, and absence of motivation and so on, common in most of Indian enterprises today and probably in enterprises in many other countries.

The modern (Western) management concepts of vision, leadership, motivation, excellence in work, achieving goals, giving work meaning, decision making and planning, are all discussed in the Bhagavad Gita. There is one major difference. While Western management thought too often deals with problems at material, external and peripheral levels, the Bhagavad

Gita tackles the issues from the grass roots level of human thinking. Once the basic thinking of man is improved, it will automatically enhance the quality of his actions and their results.

The management philosophy emanating from the West is based on the lure of materialism and on a perennial thirst for profit, irrespective of the quality of the means adopted to achieve that goal. This phenomenon has its source in the abundant wealth of the West and so 'management by materialism' has caught the fancy of all the countries the world over, India being no exception to this trend. My country, India, has been in the forefront in importing these ideas mainly because of its centuries old indoctrination by colonial rulers, which has inculcated in us a feeling that anything Western is good and anything Indian, is inferior.

The result is that, while huge funds have been invested in building temples of modem management education, no perceptible changes are visible in the improvement of the general quality of life - although the standards of living of a few has gone up. The same old struggles in almost all sectors of the economy, criminalization of institutions, social violence, exploitation and other vices are seen deep in the body politic.

The Source of the Problem

The reasons for this sorry state of affairs are not far to seek. The Western idea of management centre on making the worker (the manager) more efficient and more productive. Companies offer workers more to work more, produce more, sell more and to stick to the organization with looking for alternatives. The sole aim of extracting better and more work from the worker is to improve the bottom-line of the enterprise. The worker has become a hire able commodity, which can be used, replaced and discarded at will.

Thus, workers have been reduced to the state of a mercantile product. In such a state, it should come as no surprise to us that workers start using strikes (gheraos) sit-ins, (dharnas) go-slows, work-to-rule etc. to get maximum benefit for themselves from the organizations. Society-at-large is damaged. Thus we reach a situation in which management and workers become separate and contradictory entities with conflicting interests. There is no common goal or understanding. This, predictably, leads to suspicion, friction, disillusion and mistrust, with managers and workers at cross purposes. The absence of human values and erosion of human touch in the organizational structure has resulted in a crisis of confidence.

Western management philosophy may have created prosperity for some people some of the time at least - but it has failed in the aim of ensuring betterment of individual life and social welfare. It has remained by and large a soulless edifice and an oasis of plenty for a few in the midst of poor quality of life for many.

Hence, there is an urgent need to re-examine prevailing management disciplines - their objectives, scope and content. Management should be redefined to underline the development of the worker as a person, as a human being, and not as a mere wage-earner. With this changed perspective, management can become an instrument in the process of social, and indeed national, development.

Now let us re-examine some of the modern management concepts in the light of the Bhagavad Gita which is a primer of management-by-values.

Utilization of Available Resources

The first lesson of management science is to choose wisely and utilize scarce resources optimally. During the curtain raiser before the Mahabharata War, Duryodhana chose Sri Krishna's large army for his help while Arjuna selected Sri Krishna's wisdom for his support. This episode gives us a clue as to the nature of the effective manager - the former chose numbers, the latter, wisdom.

Attitudes towards Work

Three stone-cutters were engaged in erecting a temple. An HRD Consultant asked them what they were doing. The response of the three workers to this innocent-looking question is illuminating.

'I am a poor man. I have to maintain my family. I am making a living here,' said the first stone-cutter with a dejected face.

'Well, I work because I want to show that I am the best stone-cutter in the country,' said the second one with a sense of pride.

'Oh, I want to build the most beautiful temple in the country,' said the third one with a visionary gleam.

Their jobs were identical but their perspectives were different. What the Gita tells us is to develop the visionary perspective in the work we do. It tells us to develop a sense of larger vision in our work for the common good.

Work commitment

A popular verse of the Gita advises `detachment' from the fruits or results of actions performed in the course of one's duty. Being dedicated to work mean `working for the sake of work, generating excellence for its own sake.' If we are always calculating the date of promotion or the rate of commission before putting in our efforts, such work is not dedicated. It is not `generating excellence for its own sake' but working only for the extrinsic reward that may (or may not) result.

Working only with an eye to the anticipated benefits, means that the quality of performance of the current job or duty suffers - through mental agitation of anxiety for the future. In fact, the way the world works means that events do not always respond positively to our calculations and hence expected fruits may not always be forthcoming. So, the Gita tells us not to mortgage present commitment to an uncertain future.

Some people might argue that not seeking the business result of work and actions makes one unaccountable. In fact, the Bhagavad Gita is full of advice on the theory of cause and effect, making the doer responsible for the consequences of his deeds. While advising detachment from the avarice of selfish gains in discharging one's accepted duty, the Gita does not absolve anybody of the consequences arising from discharge of his or her responsibilities.

Thus the best means of effective performance management is the work itself. Attaining this state of mind (called `nishkama karma') is the right attitude to work because it prevents the ego, the mind, from dissipation of attention through speculation on future gains or losses.

Motivation - Self and Self-Transcendence

It has been presumed for many years that satisfying lower order needs of workers - adequate food, clothing and shelter, etc. are key factors in motivation. However, it is a common experience that the dissatisfaction of the clerk and of the Director is identical - only their scales and composition vary. It should be true that once the lower-order needs are more than satisfied, the Director should have little problem in optimizing his contribution to the organization and society. But more often than not, it does not happen like that. (`The eagle soars high but keeps its eyes firmly fixed on the dead animal below.') On the contrary, a lowly paid schoolteacher, or a self-employed artisan, may well demonstrate higher levels of self-actualization despite poorer satisfaction of their lower-order needs.

This situation is explained by the theory of self-transcendence propounded in the Gita. Self-transcendence involves renouncing egoism, putting others before oneself, emphasizing team work, dignity, co-operation, harmony and trust and, indeed potentially sacrificing lower needs for higher goals, the opposite of Maslow.

"Work must be done with detachment. It is the ego that spoils work and the ego is the centerpiece of most theories of motivation. We need not merely a theory of motivation but a theory of inspiration."

The Great Indian poet, Rabindranath Tagore (1861-1941, known as "Gurudev") says working for love is freedom in action. A concept which is described as "disinterested work" in the Gita where Sri Krishna says,

"He who shares the wealth generated only after serving the people, through work done as a sacrifice for them, is freed from all sins. On the contrary those who earn wealth only for themselves, eat sins that lead to frustration and failure."

Disinterested work finds expression in devotion, surrender and equipoise. The former two are psychological while the third is determination to keep the mind free of the dualistic (usually taken to mean "materialistic") pulls of daily experiences. Detached involvement in work is the key to mental equanimity or the state of `nirdwanda'. This attitude leads to a stage where the worker begins to feel the presence of the Supreme Intelligence guiding the embodied individual intelligence. Such de-personified intelligence is best suited for those who sincerely believe in the supremacy of organizational goals as compared to narrow personal success and achievement.

The word motivation is ubiquitous in the conversations of people such as managers who are in positions of authority. It seems to be used most often in reference to subordinates when they do not live up their managers' expectations, and it typically conveys the manager's desire to change the subordinate's behavior.

For psychologists, the term motivation is concerned with three fundamental questions

related to behavior regulation: what energizes action; how action is directed; and to what extent action is under voluntary control. Thus, although the field of motivation is concerned with the regulation and change of behavior, it goes deeper to consider the very nature of human beings.

In this work the issues of behavior regulation and change by reviewing the history of relevant theories from the divers' areas of learning, social psychology, and personality and by assessing the applicability of these theories to organizational practices and prescriptions.

Five different clusters of theories will be addressed, and the work of the pioneering psychological theorists with in each cluster will be highlighted. The first four clusters have been organized around the type of concept that is at the core of the theories. The four organizing concepts are: responses, physiological needs, goals, and psychological needs. The fifth cluster is defined by the idea that behavior is influenced by social forces. Although most of the 'mini-theories' that comprise the fifth group are not explicitly motivational, they are directly relevant to an understanding of human motivation in organizations.

Some theories have focused on responses (i.e., specific behaviors) that occurs in the presence of some stimulus or contingency of reinforcement and whose rate of emission can be observed and recorded. Skinner (1953) has been the most prominent spokesman for this approach, which has its roots in the Watson (1913) and Thorndike (1913). Derived from Thorndike's Law of Effect, the central principle in Skinner's operant theory states that when responses are reinforced their rate of occurrence will increase and when they are punished their rate of occurrence will decrease.

The concept of reinforcement is defined in terms of operationally separable consequences of a response which, if administrated immediately after the response, will increase its strength (or rate) of occurrence. In practice, the concept of reinforcement is commonly interpreted to mean material rewards and praise (i.e., verbal reinforcements), so these are advocated for increasing desired behaviors. Although it is widely recognized that punishments decreases the rate of a responding, Skinner has demonstrated that punishments are less reliable than rewards for achieving desired behavior change and that they often have disruptive emotional side effect.

Skinner's theory, which is the proto type theory of behavior control, does not have an explicit motivational (or energizing) component. The concept of reinforcement is implicitly motivational, though Skinner did not relate reinforcements, functionally defined, to any internal condition of organism. Thus, he did not address why something reinforces, only that it reinforces. In operant experiments with rats, monkey and pigeons, food and water have frequently been used as reinforces, and the researchers have ensured that these substances would reinforce by depriving the animals for several hours prior to the experiments. Still the reinforcement value of a substance was never theoretically tied to an underlying drive such as hunger or thirst; indeed, operant theorists continually asserted that it is not necessary to resort to the use of these internal variables to predict or control behavior.

In operant theory, the issue of how behaviour is directed, and thus the issue of how

behaviour is controlled, is addressed in terms of reinforcements. People are said to engage in behaviour because they were reinforced in the past (not because they expect to be reinforced in the future) and because some stimulus (properly called a contingency of reinforcement) is currently present. From this, one can readily see that in operant theory behaviours are not considered to be voluntarily regulated. Instead they are controlled by reinforcement histories and contingencies - both of which are in (or derived from) the environment.

Operant theory, which is the theoretical basis for work in behaviour modification, has been very prominent in psychology and has been frequently applied in organizational settings (Hamner, 1974). This is undoubtedly because it provides a simple and straightforward prescription for changing behaviour – namely, change the reinforcement contingencies. Although the theory is often misinterpreted and poorly employed, it has made two significant contributions to applied psychologies that are important for the practice of management. The first is that behaviour can be much more effectively controlled by reinforcing desired behaviors than by punishing undesired ones: praise works better than criticism. And, second, if reinforcements (rewards) are to work effectively, they need to be given for specific behaviors in such a way that the reinforcements are tied directly to the behaviour. Giving rewards prior to a response or independent of the response is not effective as a reinforcement strategy.

Scientific Management (Taylor, 1911), which is closely related to the idea of theory X management (McGregor, 1960), has been extremely influential in American Organization during most of this century. It is based on the notion that the planning and doing of a job should be separated- that managers should make the decision and subordinates should carry them out. In this approach, piece- rate payments, where one's pay is a direct function of one's output, are used to control the subordinates' behavior(i.e., to ensure that they carry out the managers' plans and decisions). Thus the motivational underpinnings of scientific Management are quite consistent with operant theory: rewards (i.e., reinforcements) are administered to strengthen the desired responses.

Although operant theory, and its application through practices such as piece-rate payments had an enormous impact on both experimental and applied psychology, there are at least three considerations that question its validity and limit its utility: first, to the extent that reinforcements do control behavior, it is not clear whether it is past reinforcements or expectations about future reinforcements that are determinative (e.g., Rotter, 1954); second, the theory fails although to recognize a class of potent motivators referred to as intrinsic motivators (e.g., Deci.1975); and, third, people sometimes resent being controlled and many even rebel against it (e.g., Brehm, 1966).

The motivation theories that received the greatest attention in psychology prior to 1960 are typically referred to as drive theories. Although the terminology has varied, drives can be thought of as strong, cyclically recurring urges that are based in biological disequilibria and persist as energizers of behavior until equilibrium has been restored (i.e., until the drives have been reduced). Interestingly, there have been two very different types of drive theories, each of which

has been quite prominent in its realm. The two types are best represented by Hull's (1943) drive theory and Freud's (1925) instinct theory, the former derived primarily from clinical interviews with psychiatric patients.

G. ANALYTICAL REPRESENTATION OF MOTIVATION

The figure (1) describes a production organization where raw materials, machines & manpower are involved. To achieve the desired quantum of good with quantity, motivation is required to people involved in the production activities to do the work with dedication, with the available machines & raw materials[26].

Through persuasion & motivation such situations can be developed in which they can think their work or job a respectful and honorable. There needs should be appreciated and should be met if possible. The organization should review & should reinforce where it is necessary. Motivation has been categorized as given below.

- Need based motivation
- Process based motivation
- Reinforcement based motivation

There are few other situations in working scenario that generates automatically the enthusiasm to work-hard. This can be called as self generated motivation. There is one other process of motivation and that is of recognition of the expertise of the product. The demand for the products is another motivating factor. The mutual competition of organization becomes at time a great deal of motivative force[29]. During war times, it has been experienced that workers worked over time, without charging extra wages for producing the product required for the war. It has been found that 'Will Jeep Industry' produced jeep vehicle one at every two minutes to meet the requirement of 'Friends Army' without charging extra salary. The workers in that industry were honored world wide for their dedications and work for the cause of humanity. So for the motivation study has been limited to descriptions and is evaluated abstractly such that they are poorly motivated or deeply motivated.

While carrying the study of communication, similar situation was experienced for the evaluation of information.

"'Sennen" resolved and described by using entropy for the measurement of information (1948)28, faced similar situation to evaluate the complexity of programs. He too used the term entropy through probability of occurrence of fault in the program, and interaction of 'Do loop'. The author of paper is met similar situation for metering and estimation of motivation

Three factors are to be prominent in motivation and each one is complex in providing enhanced activities of production (Physiological, safety or security, social, esteem, self actualization,), the other motivation is based on process and depends up on the transfer function of the system, Reinforcement motivation provided additional need for a specific variables. It is being reinforced.

Lemma

Whenever the product of variable are equal to the sum of the values, then, the operating function will be logarithmic.

Proof: - Assume variable are:-

$\{X, X_2 \ldots Xn\}$and are expressed by operating function H, then it can be expressed as,

$H(X_1, X_2, \ldots\ldots\ldots\ldots\ldots\ldots, Xn)$.

If the operating function are written

$H(X_1, X_2, \ldots\ldots Xn) = H_1(X_1) + H_2(X_2) + \ldots\ldots\ldots$

Then the operating function H, it will be logarithmic function Such as,

$Log(X_1, X_2, X_3 \ldots) = \log(X_1) + \log(X_2) + \ldots\ldots\ldots$

This proves the preposition.

Lemma in motivation

The motivation processes have two situations.

When element of motivation are quantitatively equal.

$$\mathbf{H_1(N_b) = H_2(P_b) = H_3(R_b) \quad \ldots (1)}$$

Where,

N_b = Need base motivation

P_b = Process base motivation

R_b = Reinforcement base motivation

Then the motivation is expressed as:

$$\mathbf{Mot = \Sigma_1^2 (H_i P_i) \quad \text{-----} (2)}$$

Where,

Mot = Motivation effort

Then,

$$\mathbf{Mot = 3\,H(K) = 3 \log K \quad \text{-----} (3)}$$

Where,

k = Constant

As equation (3) resembles entropy, then to satisfy entropy constrains $K < 1$ and say is equal to be 'P' & is called motivation factor. Then,

$$Mot = 3 \log P \quad \ldots (4)$$

If, the value of 'Mot' will be less than zero. This will satisfy second law of thermodynamics too.

*If the motivation efforts are different, for different motivation, then, the 'Mot' should be taken of Right Hand Side of the Lemma. This will minimize error in calculative of logarithmic value, as it is computed once.

$$\mathbf{Mot = H(N_b, P_b, R_b) = \log(N_b, P_b, R_b) \quad ...(5)}$$

Where,

B(i)= i^{th} motivation

B(1)=representation need base motivation (Nb)

B(2)=representation need base motivation (Pb)

B(3)=representation need base motivation (Rb)

The equation (4) represents motivation efforts in the form of entropy.

$$Mot = Log\{\Sigma_1^2 B_i\} \quad ---(6)$$

Numerical method for estimation of motivation

Motivation is a complex phenomenon and if represented by numerical values, then it is random. However to make a start, one can represent need base motivation in percentage is given below[32]—

Case 1

A.1 Need Based Motivation Process:

Physiological need fulfillment	=	90%	=	0.90
Safety and security need fulfillment	=	80%	=	0.80
Social recognition need fulfillment	=	70%	=	0.70
Esteem need fulfillment	=	50%	=	0.50
Self actualization	=	50%	=	0.50

Then the need base motivation factor is given as,

N_b= [[[[[physiological] security] social] esteem] self actualization]

N_b = [[[[[0.9].8].7].5].5]

N_b = 0.126

Case 2

A.2. Need Based Motivation Process:

Physiological need fulfillment	=	80%	=	0.80
Safety and security need fulfillment	=	75%	=	0.75
Social recognition need fulfillment	=	70%	=	0.70
Esteem need fulfillment	=	50%	=	0.50
Self actualization	=	50%	=	0.50

N_b = [[[[[0.8].75].7].5].5]

N_b = 0.105

B. Process base Motivation process:

The other motivation factor is process base motivation.

P_b = depending on input and output,

Output in any organization will be function of input and the man – machine relations; this is

expressed as given below,

P_b = [raw input] * [man- machine]

P_b = {ri(t)}* {man-machine function in percentage}

Where,

Man machine relation = 0.75 &

$r_i(t)$ = [good, fair, bad] = [80%, 50%, 20%] = [0.8,0.5,0.2]

Then,

P_b = [0.8, 0.5, 0.2] * 0.75

P_b = [0.6, 0.37, 0.15]

The man-machine relation is assumed to be 75%. Provided he remains with machine for long time.

Reinforcement motivation process:

It is a system where some process / input are reinforced in its follow-up working of the organization. One can make a policy for reinforcing percentage for the total output. In present case it is assumed to be 20% of total. Three cases are studied for the sake of explanation.

Case 1

R_b = 20% = 0.20

Case 2

R_b = 30% = 0.30

&

Case 3

R_b = 35% = 0.35

Tabular representation of the motivation estimation

Need Base Motivation	Process Base Motivation	Reinforcement Base Motivation	Total (N_b*P_b*R_b)	Total Motivation
0.126	0.6	0.2	0.015	1.823
0.126	0.37	0.2	0.0093	2.031
0.126	0.15	0.2	0.0037	2.43

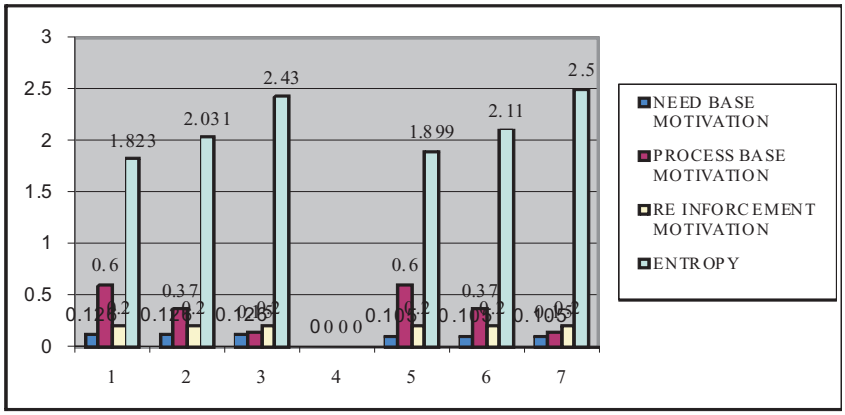
Need Base Motivation	Process Base Motivation	Reinforcement Base Motivation	Total (N_b*P_b*R_b)	Total Motivation
0.105	0.6	0.2	0.0126	1.899
0.105	0.37	0.2	0.0077	2.11
0.105	0.15	0.2	0.0031	2.5

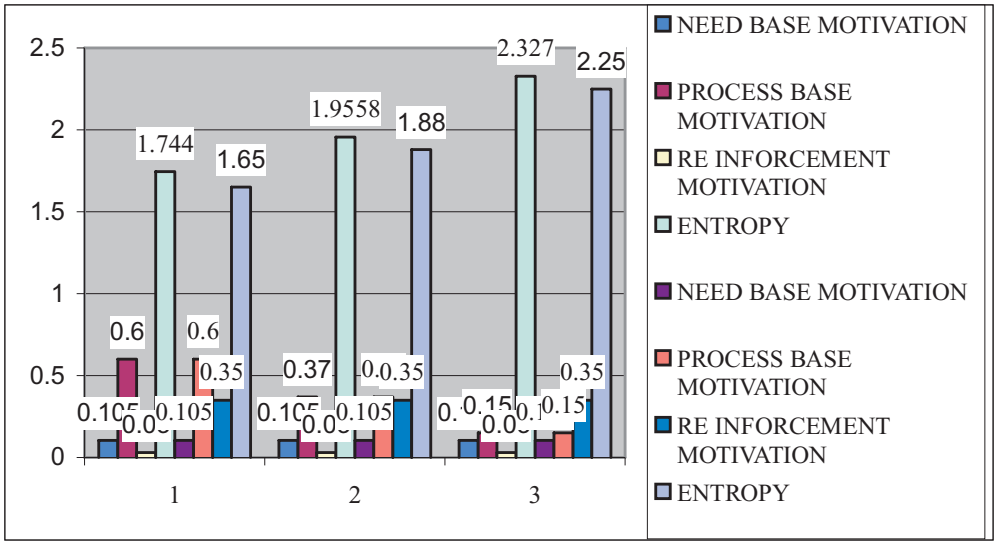
Need Base Motivation	Process Base Motivation	Reinforcement Base Motivation	Total (N_b*P_b*R_b)	Total Motivation
0.105	0.6	0.03	0.18	1.744
0.105	0.37	0.03	0.011	1.9558
0.105	0.15	0.03	0.0047	2.327

Need Base Motivation	Process Base Motivation	Reinforcement Base Motivation	Total (N_b*P_b*R_b)	Total Motivation
0.105	0.6	0.35	0.022	1.65
0.105	0.37	0.35	0.13	1.88
0.105	0.15	0.35	0.0055	2.25

Graphical representation of the performance of motivation

CASE 2





H. WORKING ABILITY

The study carried out envisages the evaluation of motivation on persons carrying out the job[30]. There can be many situations in the working scenario. The people engage on the job may be fully motivated but due to constrains and limitations on him a output may be partial. We can

introduce a factor ABILITY for envaluation in totality of the motivation with ability, the term ability 'A' can assume values between 0 to 1. Resembling with the value of probability which measure the chance for devotion of man involves in work depending upon the mental & physical condition[31].

Chance is a typical situation representation of human behavior and can be expressed using operator 'Logarithmic'.

If chance is represented using Lemma by (g < 1) then working ability will be,

Wa = log 1/g ... (7)

After substituting the value of Wa equation () in the equation of motivation equation (). We get, the impact of the motivation [EM] as given below.

EM = Mot * Wa

$$EM = \Sigma_1^3 \; H_i \quad P_i \quad log \; \frac{1}{2} \quad ..... (8)$$

I. THEORY OF GROWTH

INTRODUCTION

Theories in the area of motivation need to be appreciated from the epistemological perspective in that it is important to study the source, nature and limitations of knowledge in this particular area. The approach in this particular field has been clinical, in that, the emphasis has been on the study of human mind with a view to investigating into its deepest recesses so that the invidious phenomenon of the 'organization man' could be successfully tackled. The organization has unfairly mechanized the individual.[37] It has injected habit patterns and values, which have corroded the natural base/basis of human life.

The idea behind the clinical studies was to proper information to the management, adequate enough to doctor the organization environment in conformity with the requirements of human psychology so a healthy work environment could be established within an organization. The flip side of the coin was as interesting. By means of the understanding thus brought about, human behavior could be moulded in the desired direction or doctored in the desired mode[38].

Another objective could be listed as studying pathological behaviour on the part of the workers, diagnosing the underlying ill and suggesting remedies with a view to their integration in future management strategy. Management thus would be served with a preemptive tool in that the emergence of pathological traits could/would be prevented in the future. The approach however put upon itself, a few limitations. It has remained a half way house between psychology and administrative science; a bit of both; not completely either.

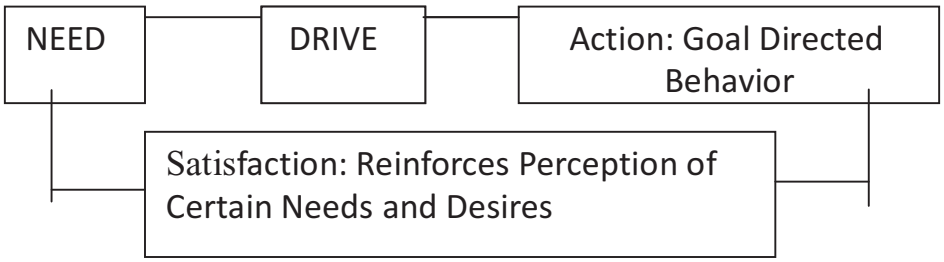
Therefore, the basic characteristics of the phenomenon of motivation are:

(a) An internal need which energizes and activates human behaviour.

(b) Drive, which is explained as the inner force that propels behaviour in a specific direction.

(c) Goals are the incentives or pay-offs that reinforce private satisfaction, which in turn reinforce the perpetuation of needs.

A SIMPLIFIED MOTIVATION PROCESS IS REPRESENTED AS FOLLOWS



MOTIVATION PROCESS: [39,40]

In this model of, need gives rise to a drive to achieve the set goal. Therefore, motivation can be defined as "the need or desire within an individual that drives him/her towards goal- directed action."

Need satisfaction is imminent if human beings are to be happy and healthy entities. An organization's 'health' in turn will be contingent on the overall well being of the people constituting it. Motivation theories have to look at the 'existential condition' i.e. 'life' of the individual inside and outside of an organization in an integrated perspective, if all ramifications of personal needs and desires on the environment of an organization and it's functioning have to be taken cognizance of /into perspective.

In case needs are not satisfied, behavioral aberrations such as frustration, aggression and indifference may crop up which may be difficult to settle/negotiate post-occurrence. According to Heresy and Blanchard[7], other forms of frustrated behavior are rationalization, regression, fixation and resignation. Rationalization is making excuses; regression, taking resort to childish behaviour which is unbecoming of a mature personality; fixation, constant repetition of useless behaviour which may be an incorrigible tendency and resignation, apathy or indifference. In case of fixation, punishment may be a dangerous management tool in that it might make the subject even more obstinate and difficult to correct. Hence a sound motivation policy on the part of the management is the only recourse, both as a preventive and a corrective tool[41].

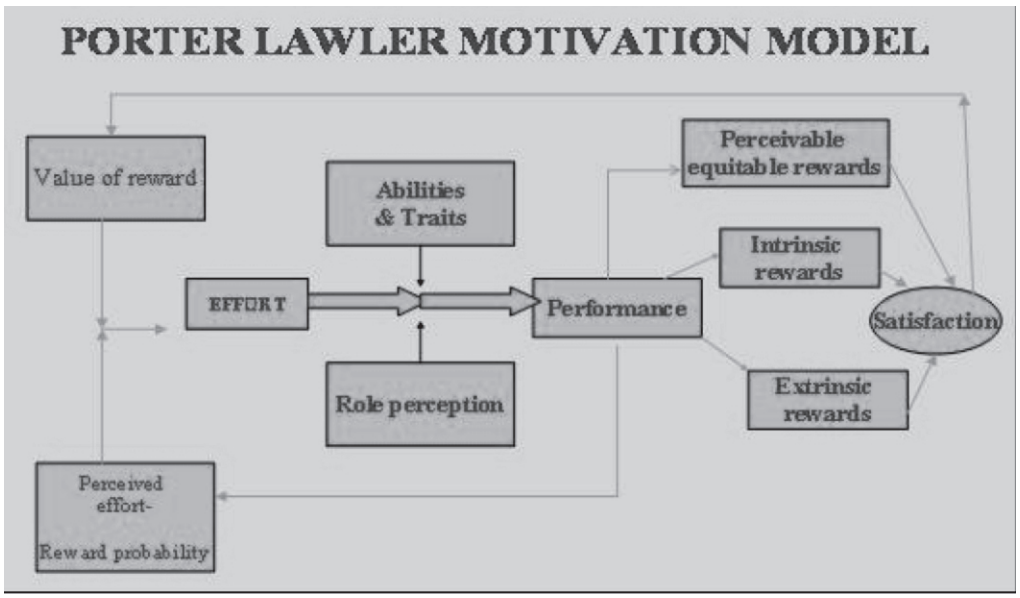
Heresy and Blanchard have brought out the difference between what they term goal-directed activity and goal activity. The former in essence is motivated behavior directed at reaching a goal. The latter implies engaging in the goal itself for e. g. in case of hunger, food is the goal, search for food, goal directed activity, and eating, the goal activity itself. Another important distinction relates to their effect on the strength of the need. In goal- directed activity, the potency or strength of the need increases as one furthers efforts towards it, unless a person feels dejected and gives up on it following repeated failures. Once goal activity begins, the strength of the need diminishes in proportion to the satisfaction derived there from.

On the other hand, Porter-Lawler Expectancy Model incorporates the relationship between perception, effort, expected reward and satisfaction (motivation). Actual performance on the job is contingent on the effort expended towards accomplishing it. Effort is understood as comprising of a few variables, which are, strength of motivation and energy exerted. The quantum of effort exerted in pursuit of a given task will depend on the "value of a reward" plus the perceived energy a person believes needs to be exerted and the probability in his eyes of reaching the set goal.

The record of actual performance in turn, also influences "Perceived effort" and "probability of reward." Acquaintance with work content and some previous experience in the matter of handling it also aids the development of an optimistic perspective with regard to it. The worker consequently feels better motivated towards accomplishing it. The individual worker's ability to comply with job requirements and understanding of the job content will go a long way in determining the effort expended in the direction of accomplishment of a set purpose.

According to Lawler, Performance leads to a set of intrinsic (sense of achievement) and extrinsic (money, status) rewards. If rewards match those expected by the worker, the result would be satisfaction. Performance can also influence perceived reward in that satisfaction will be affected by what the worker perceives as the rightful compensation for his efforts. According to Koontz and Weiherich, the Porter and Lawler model approximates to the real life situation as motivation depends on a complex mix of factors and the management needs to integrate all of those in order to devise a sound motivation policy[40]*.

The expectancy theories imply that the manager must establish the causal relationship between performance and expectation of reward.



Source: http://www.scribd.com/doc/388359/motivation
Excess Date: 07/07/2008

Working organizations are involved in production or administration work. Human work in organization can be categorized into two groups: 1. Managing group & 2.Working group. The managing group's work are very specified like –

Decides policy for the organization, arranging finance for the production process or other associated activity, handles manpower involved in organization's work or associated with other work while working group is there to execute all performance which decides by managing group. The aim of the organization is to produce maximum output with the minimum efforts and with the minimum expenditure without losing quality. This makes the task very interactive and complex. There are many factors involved in the process such as use of appropriate machines, employing trained technical hands, and uninterrupted power supply, proper supply of raw materials and good disposal of the waste.

Ones machine are installed and trained technical hand are employed, then with the ability of raw materials, the production will begins. If these requirements are fulfilled even there are chances for low production, medium production or high production rates. There are many reasons in variation of production quality because quality depends upon the working scenario and the morale of people. In this paper attention is being paid to have maximum production with quality for the given set of man and machine.

It has been reported recently in a research paper "Estimation of Motivation Using Entropy" in the journal "Journal of Business Economics and Management"** that the impact of man, his mental status and ability to work with machine has direct impact the output of the system. It has been realize that the dedication to do work with high moral values and sincerity can be generated by infusing motivation in the working class of group.

J. MOTIVATION ESTIMATION: [44, 45]

Motivation in workers is important factors, which can make the organization in profitable state, or it can divest it. Motivation is such competent phenomenon that its evaluation in numbers is very difficult. However the recent efforts in international level have suggested few methodologies along with their measuring terminology.

In short the motivation is estimated on the basis of need of worker, process functioning, reinforcement, ability to work. It has been Realized that along with the above sets of methodology a third set is very important to be considered i.e., the in sighting of Nish-Kam-Karm effect in worker or self realization for doing the job even without getting the result.

Estimation of Motivation when Need, Process, Reinforcement and Working Ability are main Parameters: [(1)]

The parameters those are considered in evaluation of the motivation are given below.

1) **Need Based Motivation (N_b)**
2) **Process Based Motivation (P_b)**
3) **Reinforcement Based Motivation (R_b)**
4) **Working Ability (Wa)**

These parameters (Need, Process, and Reinforcement) are use to evaluate motivation quantitatively. The equation derived out is given below-

Impact in Motivation = Mot * Working ability -- (1)

I M = Hi (Pi) * log (1/g) -- (2)

Where,

Mot $= H_1 (P_1) + H_2 (P_2) + H_3 (P_3)$

Mot $= H_i (P_i)$

Where,

$H_1 (P_1)$ = Need Based Motivation **(N_b)**

$H_2 (P_2)$ =Process Based Motivation **(P_b)**

$H_3 (P_3)$ =Reinforcement Based Motivation (R_b)

And, the fourth parameter working ability is also considered.

Wa = log (1/g) = Ability of People

Where,

$g < 1$

The Motivation finally calculated is as given below –

Impact in Motivation = Mot * Working ability

Effect of Nish – Kam - Karma Philosophy in Estimation of Motivation: [47,48]

Nish-Kam-Karma realization is a typical theory. If one has to do some work then it comes in mind to think the gain by the act of work. The thinking of gain or profit is human weakness. In ancient Indian philosophy, nish-kam-karma philosophy has been emphasized that the product of doing work is excellent. If the men involved are not sighting only the gain but they work with the feeling of duty to God. Such type of feeling instill a very high value of motivation. These feelings are generated in one he even scarify him. - The very burning example – is of Sardar Bhagat Singh, who was hanging to death whose weight increased, when he was sanction capital punishment.

There are large number of example of Nish-Kam-Karma generation have direct impact on the motivation. If Nish-Kam-Karma philosophies are infused in workers their Motivation can be highest degree. For such type of philosophy, it is difficult to assign Nish-Kam-Karma level. The infusion of Nish-Kam-karma obviously can be categorized in big O representation or GROWTH THEORY is applied[32]. The application of growth theory is shown in the following.

Table 1.

O Notation	*Nish-Kam-Karma Impact order in Motivation*
O (n)	In this impact the effect of the feeling is linear and the effect is measure in one by number (n). This is the lowest order of the impact of Nish-Kam-Karma in human being. Analytically it accommodate in equation as – = C (n) + d , Where 'c' and'd' are individual constant.
O (n log n)	This category of the impact of nish-kam-karma is next higher one, where, (n) is a numeral value. The constrain will be n> 10
O (n^2)	This is next order of nish-kam-karm impact which accommodates second order of the variable 'n' polynomials - = C (n^2) + d n + k The highest order is expressed while lower order are ignored.
O (n^k)	The impact of the Nish-Kam-Karm is very-very large when 'k' is large. Fiyadeen in recent time are the examples of large k categorize.

When Nish-Kam-Karma philosophy is considered in the evaluation of motivation then the final motivation will be the convolution of Motivation and growth evaluation in terms of Nish-Kam-Karma. The results so calculated are given as-

Total Motivation =Mot * Wa* O (.) --- (3)

T M = Hi (Pi) * log 1/g * O (.) --- (4)

Where,

Mot = Hi (Pi), W_a = Log 1/g, O (.) = Big O

EXAMPLE:

CALCULATE THE MOTIVATION VALUE BY GIVEN VALUES:

Need Based Motivation (N_b) = 0.126,

Process Based Motivation (P_b) = 0.6, & 0714

Reinforcement Based Motivation (R_b) = 0.2,

Working ability (g) = 0.5 and

Numeral value (n) = 20.

Motivation value = (N_b * P_b * R_b)

= 0.015

Then the motivation in terms of entropy is given as,

$$Mot = Log\, H_i (P_i)$$
$$= Log\, (N_b * P_b * R_b)$$
$$= 1.823 \text{ Entropy}$$

Let's assume,

$$\text{Working ability } (W_a) = \log (1/g)$$
$$Log\, (1/g) = 0.301$$
$$W_a = 0.30$$

Then the value of Nish-Kam-Karma growth value is given as,

$$O\, (n \log n) = 20 \log 20$$
$$= 20 * 1.301$$
$$= 26.020$$

From above we can compute the Total Motivation,

$$\mathbf{TM = H_i (P_i) * \log (1/g) * O (.)}$$
$$= 1.823 * 0.30 * 26.0205$$
$$\mathbf{TM} = 14.23 \text{ Entropy}$$

The computation gives the quantitative evaluation of the motivation, considering, all possible impact including Nish-Kam-Karm.

K. Conclusion & Suggestions

Motivation is an important term commonly used to encourage people to carry out the assigned work with sincerity, dedication, and enthusiasm. Motivation is a tonic to provide additional energy to overcome the fatigue, disinterest and feelings to drop the job. The paper describes mathematical representation for the evaluation of motivation in two terms Entropy & Working ability having used to measure the Entropy with logarithmic operator[48].

The Nishkam motivation model is a shade better explanation of how and why people get and remain motivated without obtaining the desired ultimate result than that produced by Porter and Lawler. The answer lies in process enjoyment. Nishkam is not working without any desire for result; it is enjoying the process not the ultimate result.

Nishkam give the explanation of inner motivation by this the individual can explain the inner satisfaction and dedication towards given job or assignment. Different authors explain about the goal directed activity but nobody explains the inner involvement towards the given job. When the nishkam of bhagvat geeta incorporated in the motivation factor, the percentage of motivation will be increases number of time in comparison of past motivation.

This mathematical model explain the motivation factors (Need based motivation N_b, Process Based motivation P_b, Reinforcement Based motivation R_b; Working Ability W_a; Nishkam karm O(.).

L. COMPUTER BASED PROGRAMME ON ABOVE EQUATIONS

```
/* ============== Program Description ============= */
/*   program name: IMPACT OF MOTIVATION            */
/* ================================================ */
#include<stdio.h>
#include<conio.h>
#include<math.h>
 void main()
 {
float pb,rt,man_and_machine,per_rt,per_man_and_machine;
float nb,value,nb1,nb2,nb3,nb4,nb5;
float rb,tot,tot_mot,mot,wa,g,em;
clrscr();
printf("TO CALCULATE NEED BASE\n");
printf("-----------------------\n");
printf("\n enter the value of physiological need fulfillment=");
scanf("%f",&value);
nb1=value/100;
printf("\n percentage of nb1=%f%",nb1);
printf("\n enter the value of safety and security=");
scanf("%f",&value);
nb2=value/100;
printf("\n percentage of nb2=%f%",nb2);
printf("\n enter the value of social recognition need=");
scanf("%f",&value);\
nb3=value/100;
printf("\n percentage of nb3=%f%",nb3);
printf("\n enter the value of esteem=");
scanf("%f",&value);
nb4=value/100;
printf("\n percentage of nb4=%f%",nb4);
printf("\n enter the value of self actualization=");
scanf("%f",&value);
nb5=value/100;
```

```
printf("\n pecentage of nb5=%f%",nb5);
nb=(nb1*nb2*nb3*nb4*nb5);
printf("\n\nNEED BASE(nb)=%f%",nb);
printf("\nTO CALCULATE PROCESS BASE\n");
printf("\n--------------------------\n");
printf("\n enter the value of rt=");
scanf(" %f",&rt);
per_rt=rt/100;
printf("\n Percentage value of rt=%f%",per_rt);
if(per_rt>=0.70&&per_rt<=1.00)
 {
printf("\n%f",per_rt);
printf("\nPROCESS BASE IS GOOD\n");
}
else
if(per_rt>=0.50&&per_rt<=0.69)
{
printf("\n%f",per_rt);
printf("\nPROCESS BASE IS FAIR\n");
}
else
if(per_rt>=0.01&&per_rt<=0.49)
{
printf("\n%f",per_rt);
printf("\nPROCESS BASE IS BAD\n");
}
printf("\n\n enter the value of man and machine=");
scanf(" %f",&man_and_machine);
per_man_and_machine=man_and_machine/100;
printf("\n Percentage value of man and machine=%f%",per_man_and_machine);
pb=(per_rt*per_man_and_machine);
printf("\n\nPRODUCTION BASE=%f%",pb);
printf("\n To calculate reinforcement");
printf("\\n--------------------------\n");
```

```
printf("\n\n (range 1>=rb<=40)\n enter the valid value of rb=");
scanf("%f",&rb);
tot=nb*pb*rb;
printf("\n\n TOTAL=%f",tot);
tot_mot=log(tot);
printf("\n\nTotal Motivation=%f",tot_mot);
mot=(3*log(tot_mot));
printf("Motivation=%f",mot);
printf("\n\n (range 0<g<1)\n enter the valid value of g=");
scanf("%f",&g);
if(g>=1 && g<=0)
printf("%f",g);
else
printf("please enter valid value");
wa=log(1/g);
printf("\n\n Working Ability=%f",wa);
em=mot*wa;
printf("\n\n IMPACT OF MOTIVATION=%f",em);
getch();
}
```

Motivation Programs

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#define e 2.78
void main()
{
 float tau,T,Tn,NOP,fie,deltaT,ability_fall,fall_in_ability,ab,f;
 clrscr();
 printf("enter the value of T,tau,Tn\n");
 scanf("\n%f%f%f",&T,&tau,&Tn);
 NOP=(tau-Tn)/T;
 printf("no.of production=%f",NOP);
 printf("\nenter the value of deltaT=");
 scanf("%f",&deltaT);
 fie=(tau-Tn)*deltaT/T;
 printf("\nfie=%f",fie);
 ability_fall=(deltaT/T);
 printf("\nability fall=%f",ability_fall);
 fall_in_ability=(1-(deltaT/T));
 printf("\nfall in ability=%f",fall_in_ability);
 printf("\nenetr the value of f=");
 scanf("%f",&f);
 ab=1+f*log(f);
 printf("\nprint the value of ab=%f",ab);
getch();
 }
```

Working Ability Program

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
 float total_damage,expected_work,ability_factor,alpha,rn,tf,tr;
 clrscr();
 printf("enter the value of rk,rn,tf,tr,alpha\n");
 scanf("\n%f%f%f%f ",&rn,&tf,&tr,&alpha);
 total_damage=rn*(2*tf-(1/alpha)*(1+exp(alpha*tr)-2*sin(alpha*tf)));
 printf("\n total damage= %f",total_damage);
 expected_work=(tf+tr);
 printf("\n expected work =%f",expected_work);
 ability_factor=total_damage/expected_work;
 printf("\n ability factor =%f",ability_factor);
 getch();
 }
```

Part IV

MATHEMATICAL MODEL FOR LEADERSHIP

CHAPTER 4

MATHEMATICAL MODELFOR LEADERSHIP

A. INTRODUCTION

Winston Churchill asserted that if he could have only one quality, it would be courage, because with courage he could acquire all other qualities. The motivating team leader uses en-courage-ment to stimulate team members to have the courage to believe in them.

Belief raises standards and goals. Belief generates optimism and determination. Belief creates positive expectations and intrinsic motivation. The team with courage to believe takes action.

Webster's Dictionary defines leading as guiding and directing on a course, and as serving as a channel. A leader is someone who has commanding authority and influence. Bass (1981) classifies various definitions of leadership ranging from leadership as an integral part of the group process (Krech and chuchtfield, 1948) to leadership as an influence power etc.

A broad definition of a leader as any person who influences individuals and groups within an organization, helps them in the establishment of goals, and guides them towards achievement of these goals thereby allowing them to be effective was presented[49].

If we look in any newspaper or business periodical we are likely to find profile of a political, community, or business leader or a lengthy article about how an organization is likely to be greatly affected by its new leadership. For example, while Board of Directors of American Express was debating the fate of CEO Robinson (he was replaced), the company's stock price plummeted a steep 13 percent in four days. During the industrial revolution, the study of leadership, much like research in other aspect of organization, becomes more rigorous. Scientific methods were used to understand and predict leadership effectiveness and specific attempts to identify and measure leadership characteristics were made[50].

Over time, a number of theories of leadership have been proposed. Here are some of the main ideas

- **Great Man Theory**
- **Trait Theory**
- **Behavioural Theories**
  - Role Theory
  - The Managerial Grid
- **Participative Leadership**
  - Lewin's leadership styles
  - Likert's leadership styles
- **Situational Leadership**
  - Hersey and Blanchard's Situational Leadership
  - Vroom and Yetton's Normative Model
  - House's Path-Goal Theory of Leadership
- **Contingency Theories**
  - Fiedler's Least Preferred Co-worker (LPC) Theory
  - Cognitive Resource Theory
  - Strategic Contingencies Theory
- **Transactional Leadership**
  - Leader-Member Exchange (LMX) Theory
- **Transformational Leadership**
  - Bass' Transformational Leadership Theory
  - Burns' Transformational Leadership Theory
- Kouzes and Posner's Leadership Participation Inventory

2. LEADERSHIP THEORIES

A. GREAT MAN THEORY

Leaders are born and not made. Great leaders will arise when there is a great need. Early research on leadership was based on the study of people who were already great leaders. These

people were often from the aristocracy, as few from lower classes had the opportunity to lead. This contributed to the notion that leadership had something to do with breeding[54].

The idea of the Great Man also strayed into the mythic domain, with notions that in times of need, a Great Man would arise, almost by magic. This was easy to verify, by pointing to people such as Eisenhower and Churchill, let alone those further back along the timeline, even to Jesus, Moses, Mohammed and the Buddah.

Gender issues were not on the table when the 'Great Man' theory was proposed. Most leaders were male and the thought of a Great Woman was generally in areas other than leadership. Most researchers were also male, and concerns about androcentric bias were a long way from being realized[55].

B. TRAIT THEORY

People are born with inherited traits. Some traits are particularly suited to leadership. People who make good leaders have the right (or sufficient) combination of traits.

Early research on leadership was based on the psychological focus of the day, which was of people having inherited characteristics or traits. Attention was thus put on discovering these traits, often by studying successful leaders, but with the underlying assumption that if other people could also be found with these traits, then they, too, could also become great leaders[56].

Stogdill (1974) identified the following traits and skills as critical to leaders.

Traits	Skills
Adaptable to situations	Clever (intelligent)
Alert to social environment	Conceptually skilled
Ambitious and achievement-orientated	Creative
Assertive	Diplomatic and tactful
Cooperative	Fluent in speaking
Decisive	Knowledgeable about group task
Dependable	Organised (administrative ability)
Dominant (desire to influence others)	Persuasive
Energetic (high activity level)	Socially skilled
Persistent	
Self-confident	
Tolerant of stress	
Willing to assume responsibility	

McCall and Lombardo (1983) researched both success and failure identified four primary traits by which leaders could succeed or 'derail':

Emotional stability and composure: Calm, confident and predictable, particularly when under stress.

Admitting error: Owning up to mistakes, rather than putting energy into covering up.

Good interpersonal skills: Able to communicate and persuade others without resort to negative or coercive tactics.

Intellectual breadth: Able to understand a wide range of areas, rather than having a narrow (and narrow-minded) area of expertise.

There have been many different studies of leadership traits and they agree only in the general saintly qualities needed to be a leader.

For a long period, inherited traits were sidelined as learned and situational factors were considered to be far more realistic as reasons for people acquiring leadership positions.

Paradoxically, the research into twins who were separated at birth along with new sciences such as Behavioral Genetics have shown that far more is inherited than was previously supposed. Perhaps one day they will find a 'leadership gene'.

C. BEHAVIOURAL THEORY

Leaders can be made, rather than are born. Successful leadership is based in definable, learnable behavior. Behavioral theories of leadership do not seek inborn traits or capabilities. Rather, they look at what leaders actually do[57].

If success can be defined in terms of describable actions, then it should be relatively easy for other people to act in the same way. This is easier to teach and learn then to adopt the more ephemeral 'traits' or 'capabilities'.

Behavioral is a big leap from Trait Theory, in that it assumes that leadership capability can be learned, rather than being inherent. This opens the floodgates to leadership development, as opposed to simple psychometric assessment that sorts those with leadership potential from those who will never have the chance.

A behavioural theory is relatively easy to develop, as you simply assess both leadership success and the actions of leaders. With a large enough study, you can then correlate statistically significant behaviours with success. You can also identify behaviors which contribute to failure, thus adding a second layer of understanding.

Role Theory

People define roles for themselves and others based on social learning and reading. People form expectations about the roles that they and others will play. People subtly encourage others to act within the role expectations they have for them. People will act within the roles they adopt.

We all have internal schemes about the role of leaders, based on what we read, discuss and

so on. We subtly send these expectations to our leaders, acting as role senders, for example through the balance of decisions we take upon ourselves and the decisions we leave to the leader.

Leaders are influenced by these signals, particularly if they are sensitive to the people around them, and will generally conform to these, playing the leadership role that is put upon them by others.

Within organizations, there is much formal and informal information about what the leader's role should be, including 'leadership values', culture, training sessions, modeling by senior managers, and so on. These and more (including contextual factors) act to shape expectations and behaviors around leadership.

Role conflict can also occur when people have differing expectations of their leaders. It also happens when leaders have different ideas about what they should be doing vs. the expectations that are put upon them.

Role expectations of a leader can vary from very specific to a broad idea within which the leader can define their own style.

When role expectations are low or mixed, then this may also lead to role conflict

The Managerial Grid

Leaders may be concerned for their people and they also must also have some concern for the work to be done. The question is, how much attention to they pay to one or the other? This is a model defined by Blake and Mouton in the early 1960s.

Concern for People	*High*	Country Club management		Team management
	Medium		Middle of the road management	
	Low	Impoverished management		Authority-compliance
		Low	*Medium*	*High*
		Concern for Production (Task)		

Impoverished management

Minimum effort to get the work done. A basically lazy approach that avoids as much work as possible.

Authority-compliance

Strong focus on task, but with little concern for people. Focus on efficiency, including the elimination of people wherever possible.

Country Club management

Care and concern for the people, with a comfortable and friendly environment and collegial style. But a low focus on task may give questionable results.

Middle of the road management

A weak balance of focus on both people and the work. Doing enough to get things done, but not pushing the boundaries of what may be possible.

Team management

Firing on all cylinders: people are committed to task and leader is committed to people.

D. PARTICIPATIVE LEADERSHIP

This is a well-known grid that uses the Task vs. Person preference that appears in many other studies, such as the Michigan Leadership Studies and the Ohio State Leadership Studies. Many other task-people models and variants have appeared since then. They are both clearly important dimensions, but as other models point out, they are not all there is to leadership and management[59,60].

The Managerial Grid was the original name. It later changed to the Leadership Grid.

Involvement in decision-making improves the understanding of the issues involved by those who must carry out the decisions.

People are more committed to actions where they have involved in the relevant decision-making. People are less competitive and more collaborative when they are working on joint goals.

When people make decisions together, the social commitment to one another is greater and thus increases their commitment to the decision.

Several people deciding together make better decisions than one person alone.

Style

A Participative Leader, rather than taking autocratic decisions, seeks to involve other people in the process, possibly including subordinates, peers, superiors and other stakeholders. Often, however, as it is within the managers' whim to give or deny control to his or her subordinates, most participative activity is within the immediate team. The question of how much influence others are given thus may vary on the manager's preferences and beliefs, and a whole spectrum of participation is possible, as in the table below.

Not participative			Highly participative	
Autocratic decision by leader	Leader proposes decision, listens to feedback, then decides	Team proposes decision, leader has final decision	Joint decision with team as equals	Full delegation of decision to team

There are many varieties on this spectrum, including stages where the leader sells the idea to the team. Another variant is for the leader to describe the 'what' of objectives or goals and let the team or individuals decide the 'how' of the process by which the 'how' will be achieved (this is often called 'Management by Objectives').

The level of participation may also depend on the type of decision being made. Decisions on how to implement goals may be highly participative, whilst decisions during subordinate performance evaluations are more likely to be taken by the manager.

Lewin's leadership styles

There are many potential benefits of participative leadership, as indicated in the assumptions, above. This approach is also known as consultation, empowerment, joint decision-making, democratic leadership, Management By Objective (MBO) and power-sharing.

Participative Leadership can be a sham when managers ask for opinions and then ignore them. This is likely to lead to cynicism and feelings of betrayal.

Kurt Lewin and colleagues did leadership decision experiments in 1939 and identified three different styles of leadership, in particular around decision-making.

Autocratic

In the autocratic style, the leader takes decisions without consulting with others. The decision is made without any form of consultation. In Lewin's experiments, he found that this caused the most level of discontent.

An autocratic style works when there is no need for input on the decision, where the decision would not change as a result of input, and where the motivation of people to carry out subsequent actions would not be affected whether they were or were not involved in the decision-making.

Democratic

In the democratic style, the leader involves the people in the decision-making, although

the process for the final decision may vary from the leader having the final say to them facilitating consensus in the group.

Democratic decision-making is usually appreciated by the people, especially if they have been used to autocratic decisions with which they disagreed. It can be problematic when there are a wide range of opinions and there is no clear way of reaching an equitable final decision.

Laissez-Faire

The laissez-faire style is to minimize the leader's involvement in decision-making, and hence allowing people to make their own decisions, although they may still be responsible for the outcome.

Laissez-faire works best when people are capable and motivated in making their own decisions, and where there is no requirement for a central coordination, for example in sharing resources across a range of different people and groups.

In Lewin et al's experiments, he discovered that the most effective style was Democratic. Excessive autocratic styles led to revolution, whilst under a Laissez-faire approach, people were not coherent in their work and did not put in the energy that they did when being actively led.

These experiments were actually done with groups of children, but were early in the modern era and were consequently highly influential.

Likert's leadership styles

Rensis Likert identified four main styles of leadership, in particular around decision-making and the degree to which people are involved in the decision.

Exploitive authoritative

In this style, the leader has a low concern for people and uses such methods as threats and other fear-based methods to achieve conformance. Communication is almost entirely downwards and the psychologically distant concerns of people are ignored.

Benevolent authoritative

When the leader adds concern for people to an authoritative position, a 'benevolent dictatorship' is formed. The leader now uses rewards to encourage appropriate performance and listens more to concerns lower down the organization, although what they hear is often rose-tinted, being limited to what their subordinates think that the boss wants to hear. Although there may be some delegation of decisions, almost all major decisions are still made centrally.

Consultative

The upward flow of information here is still cautious and rose-tinted to some degree, although the leader is making genuine efforts to listen carefully to ideas. Nevertheless, major decisions are still largely centrally made.

Participative

At this level, the leader makes maximum use of participative methods, engaging people lower down the organization in decision-making. People across the organization are psychologically closer together and work well together at all levels.

This is a classic 1960s view in that it is still very largely top-down in nature, with the cautious addition collaborative elements towards the Utopian final state.

E. SITUATIONAL LEADERSHIP

The best action of the leader depends on a range of situational factors[59].

Style

When a decision is needed, an effective leader does not just fall into a single preferred style, such as using transactional or transformational methods. In practice, as they say, things are not that simple.

Factors that affect situational decisions include motivation and capability of followers. This, in turn, is affected by factors within the particular situation. The relationship between followers and the leader may be another factor that affects leader behavior as much as it does follower behavior.

The leaders' perception of the follower and the situation will affect what they do rather than the truth of the situation. The leader's perception of themselves and other factors such as stress and mood will also modify the leaders' behavior.

Yukl (1989) seeks to combine other approaches and identifies six variables:

- **Subordinate effort:** the motivation and actual effort expended.
- **Subordinate ability and role clarity:** followers knowing what to do and how to do it.
- **Organization of the work:** the structure of the work and utilization of resources.
- **Cooperation and cohesiveness:** of the group in working together.
- **Resources and support:** the availability of tools, materials, people, etc.
- **External coordination:** the need to collaborate with other groups.

Leaders here work on such factors as external relationships, acquisition of resources, managing demands on the group and managing the structures and culture of the group.

Tannenbaum and Schmidt (1958) identified three forces that led to the leader's action: the forces in the situation, the forces in then follower and also forces in the leader. This recognizes that the leader's style is highly variable, and even such distant events as a family argument can lead to the displacement activity of a more aggressive stance in an argument than usual.

Maier (1963) noted that leaders not only consider the likelihood of a follower accepting a suggestion, but also the overall importance of getting things done. Thus in critical situations, a leader is more likely to be directive in style simply because of the implications of failure.

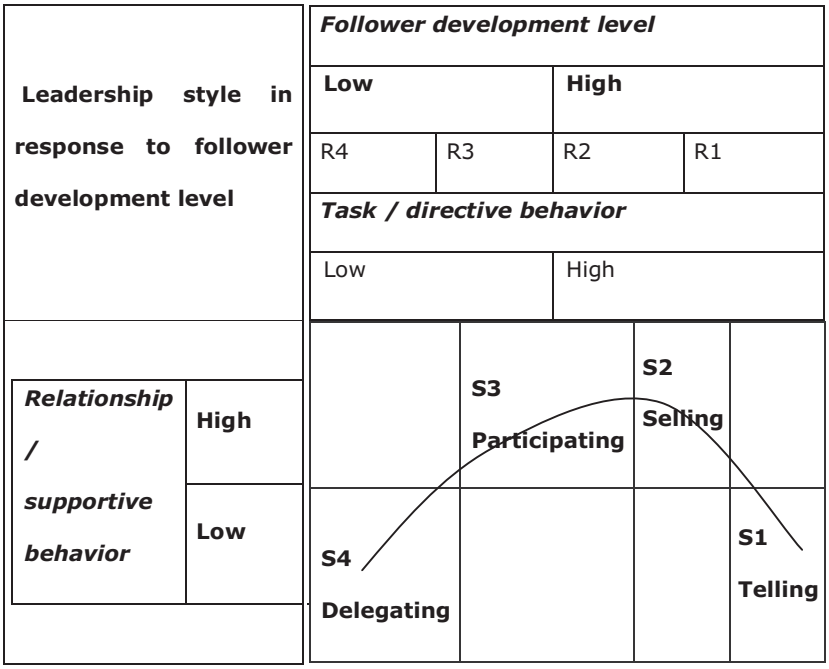
Hersey & Blanchard's Situational Leadership

Leaders should adapt their style to follower development style (or 'maturity'), based on how ready and willing the follower is to perform required tasks (that is, their competence and motivation).

There are four leadership styles (S1 to S4) that match the development levels (D1 to D4) of the followers.

The four styles suggest that leaders should put greater or less focus on the task in question and/or the relationship between the leader and the follower, depending on the development level of the follower.

Style



S1: Telling / Directing

Follower: R1: Low competence, low commitment / Unable and unwilling or insecure

Leader: High task focus, low relationship focus

When the follower cannot do the job and is unwilling or afraid to try, then the leader takes a highly directive role, telling them what to do but without a great deal of concern for the relationship. The leader may also provide a working structure, both for the job and in terms of how

the person is controlled.

The leader may first find out why the person is not motivated and if there are any limitations in ability. These two factors may be linked, for example where a person believes they are less capable than they should be may be in some form of denial or other coping. They follower may also lack self-confidence as a result.

If the leader focused more on the relationship, the follower may become confused about what must be done and what is optional. The leader thus maintains a clear 'do this' position to ensure all required actions are clear.

S2: Selling / Coaching

Follower: R2: Some competence, variable commitment / Unable but willing or motivated

Leader: High task focus, high relationship focus

When the follower can do the job, at least to some extent, and perhaps is over-confident about their ability in this, then 'telling' them what to do may de-motivate them or lead to resistance. The leader thus needs to 'sell' another way of working, explaining and clarifying decisions.

The leader thus spends time listening and advising and, where appropriate, helping the follower to gain necessary skills through coaching methods.

Note: S1 and S2 are leader-driven.

S3: Participating / Supporting

Follower: R3: High competence, variable commitment / Able but unwilling or insecure

Leader: Low task focus, high relationship focus

When the follower can do the job, but is refusing to do it or otherwise showing insufficient commitment, the leader need not worry about showing them what to do, and instead is concerned with finding out why the person is refusing and thence persuading them to cooperate.

There is less excuse here for followers to be reticent about their ability, and the key is very much around motivation. If the causes are found then they can be addressed by the leader. The leader thus spends time listening, praising and otherwise making the follower feel good when they show the necessary commitment.

S4: Delegating / Observing

Follower: R4: High competence, high commitment / Able and willing or motivated

Leader: Low task focus, low relationship focus

When the follower can do the job and is motivated to do it, then the leader can basically leave them to it, largely trusting them to get on with the job although they also may need to keep a relatively distant eye on things to ensure everything is going to plan.

Followers at this level have less need for support or frequent praise, although as with anyone, occasional recognition is always welcome.

Note: S3 and S4 are follower-led.

Hersey and Blanchard (of 'One Minute Manager' fame) have written a short and very readable book on the approach. It is simple and easy to understand, which makes it particularly attractive for practicing managers who do not want to get into heavier material. It also is accepted in wider spheres and often appears in college courses.

It is limited, however, and is based on assumptions that can be challenged, for example the assumption that at the 'telling' level, the relationship is of lower importance.

Vroom and Yetton's Normative Model

Decision acceptance increases commitment and effectiveness of action. Participation increases decision acceptance.

Decision quality is the selection of the best alternative, and is particularly important when there are many alternatives. It is also important when there are serious implications for selecting (or failing to select) the best alternative.

Decision acceptance is the degree to which a follower accepts a decision made by a leader. Leaders focus more on decision acceptance when decision quality is more important.

Vroom and Yetton defined five different decision procedures. Two are autocratic (A1 and A2), two are consultative (C1 and C2) and one is Group based (G2).

A1: Leader takes known information and then decides alone.

A2: Leader gets information from followers, and then decides alone.

C1: Leader shares problem with followers individually, listens to ideas and then decides alone.

C2: Leader shares problems with followers as a group, listens to ideas and then decides alone.

G2: Leader shares problems with followers as a group and then seeks and accepts consensus agreement.

Situational factors that influence the method are relatively logical:

- When decision quality is important and followers possess useful information, then A1 and A2 are not the best method.
- When the leader sees decision quality as important but followers do not, then G2 is inappropriate.
- When decision quality is important, when the problem is unstructured and the leader lacks information / skill to make the decision alone, then G2 is best.
- When decision acceptance is important and followers are unlikely to accept an autocratic decision, then A1 and A2 are inappropriate.
- When decision acceptance is important but followers are likely to disagree with one

another, then A1, A2 and C1 are not appropriate, because they do not give opportunity for differences to be resolved.

- When decision quality is not important but decision acceptance is critical, then G2 is the best method.
- When decision quality is important, all agree with this, and the decision is not likely to result from an autocratic decision then G2 is best.

Vroom and Yetton (1973) took the earlier generalized situational theories that noted how situational factors cause almost unpredictable leader behavior and reduced this to a more limited set of behaviors.

The 'normative' aspect of the model is that it was defined more by rational logic than by long observation.

The model is most likely to work when there is clear and accessible opinions about the decision quality importance and decision acceptance factors. However these are not always known with any significant confidence.

Path-Goal Theory of Leadership

The Path-Goal Theory of Leadership was developed to describe the way that leaders encourage and support their followers in achieving the goals they have been set by making the path that they should take clear and easy[51].

In particular, leaders:

- Clarify the path so subordinates know which way to go.
- Remove roadblocks that are stopping them going there.
- Increasing the rewards along the route.

Leaders can take a strong or limited approach in these. In clarifying the path, they may be directive or give vague hints. In removing roadblocks, they may scour the path or help the follower move the bigger blocks. In increasing rewards, they may give occasional encouragement or pave the way with gold. This variation in approach will depend on the situation, including the follower's capability and motivation, as well as the difficulty of the job and other contextual factors[52,53].

House and Mitchell (1974) describe four styles of leadership:

Supportive leadership

Considering the needs of the follower, showing concern for their welfare and creating a friendly working environment. This includes increasing the follower's self-esteem and making the job more interesting. This approach is best when the work is stressful, boring or hazardous.

Directive leadership

Telling followers what needs to be done and giving appropriate guidance along the way. This includes giving them schedules of specific work to be done at specific times. Rewards may also

be increased as needed and role ambiguity decreased (by telling them what they should be doing).

This may be used when the task is unstructured and complex and the follower is inexperienced. This increases the follower's sense of security and control and hence is appropriate to the situation.

Participative leadership

Consulting with followers and taking their ideas into account when making decisions and taking particular actions. This approach is best when the followers are expert and their advice is both needed and they expect to be able to give it.

Achievement-oriented leadership

Setting challenging goals, both in work and in self-improvement (and often together). High standards are demonstrated and expected. The leader shows faith in the capabilities of the follower to succeed. This approach is best when the task is complex.

Leaders who show the way and help followers along a path are effectively 'leading'.

This approach assumes that there is one right way of achieving a goal and that the leader can see it and the follower cannot. This casts the leader as the knowing person and the follower as dependent. It also assumes that the follower is completely rational and that the appropriate methods can be deterministically selected depending on the situation.

F. Contingency Theory

The leader's ability to lead is contingent upon various situational factors, including the leader's preferred style, the capabilities and behaviors of followers and also various other situational factors.

Contingency theories are a class of behavioral theory that contends that there is no one best way of leading and that a leadership style that is effective in some situations may not be successful in others.

An effect of this is that leaders who are very effective at one place and time may become unsuccessful either when transplanted to another situation or when the factors around them change.

This helps to explain how some leaders who seem for a while to have the 'Midas touch' suddenly appear to go off the boil and make very unsuccessful decisions.

Contingency theory is similar to situational theory in that there is an assumption of no simple one right way. The main difference is that situational theory tends to focus more on the behaviors that the leader should adopt, given situational factors (often about follower behavior), whereas contingency theory takes a broader view that includes contingent factors about leader capability and other variables within the situation.

Fiedler's Least Preferred Co-worker (LPC) Theory

Leaders prioritize between task-focus and people-focus. Relationships, power and task structure are the three key factors that drive effective styles.

Fiedler identified the a Least Preferred Co-Worker scoring for leaders by asking them first to think of a person with which they worked that they would like least to work with again, and then to score the person on a range of scales between positive factors (friendly, helpful, cheerful, etc.) and negative factors (unfriendly, unhelpful, gloomy, etc.). A high LPC leader generally scores the other person as positive and a low LPC leader scores them as negative.

High LPC leaders tend to have close and positive relationships and act in a supportive way, even prioritizing the relationship before the task. Low LPC leaders put the task first and will turn to relationships only when they are satisfied with how the work is going.

Three factors are then identified about the leader, member and the task, as follows:

- **Leader-Member Relations:** The extent to which the leader has the support and loyalties of followers and relations with them are friendly and cooperative.
- **Task structure:** The extent, to which tasks are standardised, documented and controlled.
- **Leader's Position-power:** The extent to which the leader has authority to assess follower performance and give reward or punishment.

The best LPC approach depends on a combination of there three. Generally, a high LPC approach is best when leader-member relations are poor, except when the task is unstructured and the leader is weak, in which a low LPC style is better.

S.No.	Leader-Member Relations	Task structure	Leader's Position-power	Most Effective leader
1	Good	Structured	Strong	Low LPC
2	Good	Structured	Weak	Low LPC
3	Good	Unstructured	Strong	Low LPC
4	Good	Unstructured	Weak	High LPC
5	Poor	Structured	Strong	High LPC
6	Poor	Structured	Weak	High LPC
7	Poor	Unstructured	Strong	High LPC
8	Poor	Unstructured	Weak	Low LPC

This approach seeks to identify the underlying beliefs about people, in particular whether the leader sees others as positive (high LPC) or negative (low LPC). The neat trick of the model is to take someone where it would be very easy to be negative about them.

This is another approach that uses task- vs. people-focus as a major categorization of the leader's style.

Cognitive Resource Theory

Intelligence and experience and other cognitive resources are factors in leadership success. Cognitive capabilities, although significant are not enough to predict leadership success. Stress impacts the ability to make decisions.

Cognitive Resource Theory predicts that:

1. A leader's cognitive ability contributes to the performance of the team only when the leader's approach is directive.

When leaders are better at planning and decision-making, in order for their plans and decisions to be implemented, they need to tell people what to do, rather than hope they agree with them.

When they are not better than people in the team, then a non-directive approach is more appropriate, for example where they facilitate an open discussion where the ideas of team can be aired and the best approach identified and implemented.

2. Stress affects the relationship between intelligence and decision quality.

When there is low stress, then intelligence is fully functional and makes an optimal contribution. However, during high stress, a natural intelligence not only makes no difference, but it may also have a negative effect. One reason for this may be that an intelligent person seeks rational solutions, which may not be available (and may be one of the causes of stress). In such situations, a leader who is inexperienced in 'gut feel' decisions is forced to rely on this unfamiliar approach. Another possibility is that the leader retreats within him/her, to think hard about the problem, leaving the group to their own devices.

3. Experience is positively related to decision quality under high stress.

When there is a high stress situation and intelligence is impaired, experience of the same or similar situations enables the leader to react in appropriate ways without having to think carefully about the situation. Experience of decision-making under stress also will contribute to a better decision than trying to muddle through with brain-power alone.

4. for simple tasks, leader intelligence and experience is irrelevant.

When subordinates are given tasks which do not need direction or support, then it does not matter how good the leader is at making decisions, because they are easy to make, even for subordinates, and hence do not need any further support.

CRT arose out of dissatisfaction with Trait Theory.

Fiedler also linked CRT with his Least Preferred Co-worker (LPC) Theory, suggesting that high LPC scores are the main drivers of directive behavior.

A particularly significant aspect of CRT is the principle that intelligence is the main factor in low-stress situations, whilst experience counts for more during high-stress moments.

Strategic Contingencies Theory

Intra-organizational power depends on three factors: problem skills, actor centrality and uniqueness of skill. If you have the skills and expertise to resolve important problems, then you are going to be in demand. And by the law of supply and demand, that gives you're the upper hand in negotiations. It also gives you power from the reciprocity created.

If you work in a central part of the workflow of the organization, then what you do is very important. This gives you many opportunities to be noticed. It also means you are on the critical path, such that if your part of the company fails, the whole show stops. Again creating attention and giving you bargaining power.

Finally, if you are difficult to replace, then if you do make enemies up the hierarchy, then they cannot just move you out or sideways.

Example

A production manager in an organization is in charge of a key manufacturing operation (centrality), and understands its complexities very well (uniqueness). From a long experience, when things go wrong, he is very good at fixing things, both mechanically and with the unions.

So what?

Using it

Get a job on the critical path through the organization. Become expert in problem solving in it. Acquire and defend knowledge and skills that nobody else has.

Defending

Do not let any one person become indispensable

G. TRANSACTIONAL LEADERSHIP

People are motivated by reward and punishment. Social systems work best with a clear chain of command. When people have agreed to do a job, a part of the deal is that they cede all authority to their manager. The prime purpose of a subordinate is to do what their manager tells them to do.

Style

The transactional leader works through creating clear structures whereby it is clear what is required of their subordinates, and the rewards that they get for following orders. Punishments are not always mentioned, but they are also well-understood and formal systems of discipline are usually in place.

The early stage of Transactional Leadership is in negotiating the contract whereby the subordinate is given a salary and other benefits, and the company (and by implication the subordinate's manager) gets authority over the subordinate.

When the Transactional Leader allocates work to a subordinate, they are considered to be fully responsible for it, whether or not they have the resources or capability to carry it out. When things go wrong, then the subordinate is considered to be personally at fault, and is punished for

their failure (just as they are rewarded for succeeding).

The transactional leader often uses management by exception, working on the principle that if something is operating to defined (and hence expected) performance then it does not need attention. Exceptions to expectation require praise and reward for exceeding expectation, whilst some kind of corrective action is applied for performance below expectation.

Whereas Transformational Leadership has more of a 'selling' style, Transactional Leadership, once the contract is in place, takes a 'telling' style.

Transactional leadership is based in contingency, in that reward or punishment is contingent upon performance.

Despite much research that highlights its limitations, Transactional Leadership is still a popular approach with many managers. Indeed, in the Leadership vs. Management spectrum, it is very much towards the management end of the scale.

The main limitation is the assumption of 'rational man', a person who is largely motivated by money and simple reward, and hence whose behavior is predictable. The underlying psychology is Behaviorism, including the Classical Conditioning of Pavlov and Skinner's Operant Conditioning. These theories are largely based on controlled laboratory experiments (often with animals) and ignore complex emotional factors and social values.

In practice, there is sufficient truth in Behaviorism to sustain Transactional approaches. This is reinforced by the supply-and-demand situation of much employment, coupled with the effects of deeper needs, as in Maslow's Hierarchy. When the demand for a skill outstrips the supply, then Transactional Leadership often is insufficient, and other approaches are more effective.

Leader-Member Exchange (LMX) Theory

Leader-Member Exchange Theory, also called LMX or Vertical Dyad Linkage Theory, describes how leaders in groups maintain their position through a series of tacit exchange agreements with their members.

In-group and out-group

In particular, leaders often have a special relationship with an inner circle of trusted lieutenants, assistants and advisors, to whom they give high levels of responsibility, decision influence, and access to resources. This in-group pays for their position. They work harder, are more committed to task objectives, and share more administrative duties. They are also expected to be fully committed and loyal to their leader. The out-group, on the other hand, are given low levels of choice or influence.

This also puts constraints upon the leader. They have to nurture the relationship with their inner circle whilst balancing giving them power with ensuring they do not have enough to strike out on their own.

The LMX process

These relationships, if they are going to happen, start very soon after a person joins the group and follow three stages.

1. Role taking

The member joins the team and the leader assesses their abilities and talents. Based on this, the leader may offer them opportunities to demonstrate their capabilities.

Another key factor in this stage is the discovery by both parties of how the other likes to be respected.

2. Role making

In the second phase, the leader and member take part in an unstructured and informal negotiation whereby a role is created for the member and the often-tacit promise of benefit and power in return for dedication and loyalty takes place.

Trust-building is very important in this stage, and any felt betrayal, especially by the leader, can result in the member being relegated to the out-group.

This negotiation includes relationship factors as well as pure work-related ones, and a member who is similar to the leader in various ways is more likely to succeed. This perhaps explains why mixed gender relationships regularly are less successful than same-gender ones (it also affects the seeking of respect in the first stage). The same effect also applies to cultural and racial differences.

3. Routinization

In this phase, a pattern of ongoing social exchange between the leader and the member becomes established.

Success factors

Successful members are thus similar in many ways to the leader (which perhaps explains why many senior teams are all white, male, middle-class and middle-aged). They work hard at building and sustaining trust and respect.

To help this, they are empathetic, patient, reasonable, sensitive, and are good at seeing the viewpoint of other people (especially the leader). Aggression, sarcasm and an egocentric view are keys to the out-group wash-room.

The overall quality of the LMX relationship varies with several factors. Curiously, it is better when the challenge of the job is extremely high or extremely low. The size of the group, financial resource availability and the overall workload are also important.

Onwards and upwards

The principle works upwards as well. The leader also gains power by being a member of their manager's inner circle, which then can then share on downwards. People at the bottom of an organization with unusual power may get it from an unbroken chain of circles up to the hierarchy.

So what?

Using it

When you join a team, work hard to also join the inner circle. Take on more than your share of administrative and other tasks. Demonstrate unswerving loyalty. See your leader's point of

view. Be reasonable and supportive in your challenges to them, and pick your moments carefully.

As a leader, pick your inner circle with care. Reward them for their loyalty and hard work, whilst being careful about maintaining commitment of other people.

Defending

If you want to be an 'ordinary' member of a team, play your part carefully. There will be others with more power. If you want to lead on equal team, beware of those who curry favor.

H. TRANSFORMATIONAL LEADERSHIP

People will follow a person who inspires them. A person with visions and passions can achieve great things. The way to get things done is by injecting enthusiasm and energy.

Style

Working for a Transformational Leader can be a wonderful and uplifting experience. They put passion and energy into everything. They care about you and want you to succeed.

Developing the vision

Transformational Leadership starts with the development of a vision, a view of the future that will excite and convert potential followers. This vision may be developed by the leader, by the senior team or may emerge from a broad series of discussions. The important factor is the leader buys into it, hook, line and sinker.

Selling the vision

The next step, which in fact never stops, is to constantly sell the vision. This takes energy and commitment, as few people will immediately buy into a radical vision, and some will join the show much more slowly than others. The Transformational Leader thus takes every opportunity and will use whatever works to convince others to climb on board the bandwagon.

In order to create followers, the Transformational Leader has to be very careful in creating trust, and their personal integrity is a critical part of the package that they are selling. In effect, they are selling themselves as well as the vision.

Finding the way forwards

In parallel with the selling activity is seeking the way forward. Some Transformational Leaders know the way, and simply want others to follow them. Others do not have a ready strategy, but will lead happily the exploration of possible routes to the Promised Land.

The route forwards may not be obvious and may not be plotted in details, but with a clear vision, the direction will always be known. Thus finding the way forward can be an ongoing process of course correction and the Transformational Leader will accept that there will be failures and blind canyons along the way. As long as they feel progress is being made, they will be happy.

Leading the charge

The final stage is to remain up-front and central during the action. Transformational Leaders are always visible and will stand up to be counted rather than hide behind their troops. They show by their attitudes and actions how everyone else should behave. They also make continue efforts

to motivate and rally their followers, constantly doing the rounds, listening, soothing and enthusing.

It is their unswerving commitment as much as anything else that keeps people going, particularly through the darker times when some may question whether the vision can ever be achieved. If the people do not believe that they can succeed, then their efforts will flag. The Transformational Leader seeks to infect and reinfect their followers with a high level of commitment to the vision.

One of the methods the Transformational Leader uses to sustain motivation is in the use of ceremonies, rituals and other cultural symbolism. Small changes get big hurrahs, pumping up their significance as indicators of real progress.

Overall, they balance their attention between action that creates progress and the mental state of their followers. Perhaps more than other approaches, they are people-oriented and believe that success comes first and last through deep and sustained commitment.

Whilst the Transformational Leader seeks overtly to transform the organization, there is also a tacit promise to followers that they also will be transformed in some way, perhaps to be more like this amazing leader. In some respects, then, the followers are the product of the transformation.

Transformational Leaders are often charismatic, but are not as narcissistic as pure Charismatic Leaders, who succeed through a belief in themselves rather than belief in others.

One of the traps of Transformational Leadership is that passion and confidence can easily be mistaken for truth and reality. Whilst it is true that great things have been achieved through enthusiastic leadership, it is also true that many passionate people have led the charge right over the cliff and into a bottomless chasm. Just because someone believes they are right, it does not mean they are right.

Paradoxically, the energy that gets people going can also cause them to give up. Transformational Leaders often have large amounts of enthusiasm which, if relentlessly applied, can wear out their followers.

Transformational Leaders also tend to see the big picture, but not the details, where the devil often lurks. If they do not have people to take care of this level of information, then they are usually doomed to fail.

Finally, Transformational Leaders, by definition, seek to transform. When the organization does not need transforming and people are happy as they are, then such a leader will be frustrated. Like wartime leaders, however, given the right situation they come into their own and can be personally responsible for saving entire companies.

Bass' Transformational Leadership Theory

Awareness of task importance motivates people. A focus on the team or organization produces better work.

Bass defined transformational leadership in terms of how the leader affects followers, who are intended to trust, admire and respect the transformational leader.

He identified three ways in which leaders transform followers:

- Increasing their awareness of task importance and value.
- Getting them to focus first on team or organizational goals, rather than their own interests.
- Activating their higher-order needs.

Charisma is seen as necessary, but not sufficient, for example in the way that charismatic movie stars may not make good leaders. Two key charismatic effects that transformational leaders achieve is to evoke strong emotions and to cause identification of the followers with the leader. This may be through stirring appeals. It may also occur through quieter methods such as coaching and mentoring.

Bass has recently noted that authentic transformational leadership is grounded in moral foundations that are based on four components:

- Idealized influence
- Inspirational motivation
- Intellectual stimulation
- Individualized consideration

...and three moral aspects:

- The moral character of the leader.
- The ethical values embedded in the leader's vision, articulation, and program (which followers either embrace or reject).
- The morality of the processes of social ethical choice and action that leaders and followers engage in and collectively pursue.

This is in contrast with pseudo-transformational leadership, where, for example, in-group/out-group 'us and them' games are used to bond followers to the leader.

In contrast to Burns, who sees transformational leadership as being inextricably linked with higher order values, Bass sees it as amoral, and attributed transformational skills to people such as Adolf Hitler and Jim Jones.

Burns' Transformational Leadership Theory

Association with a higher moral position is motivating and will result in people following a leader who promotes this. Working collaboratively is better than working individually.

Burns defined transformational leadership as a process where leaders and followers engage in a mutual process of 'raising one another to higher levels of morality and motivation.'

Transformational leaders raise the bar by appealing to higher ideals and values of followers. In doing so, they may model the values themselves and use charismatic methods to attract people to the values and to the leader.

Burns' view is that transformational leadership is more effective than transactional leadership, where the appeal is to more selfish concern. An appeal to social values thus encourage

people to collaborate, rather than working as individuals (and potentially competitively with one another). He also views transformational leadership as an ongoing process rather than the discrete exchanges of the transactional approach.

Using social and spiritual values as a motivational lever is very powerful as they are both hard to deny and also give people an uplifting sense of being connected to a higher purpose, thus playing to the need for a sense of meaning and identity.

Ideals are higher in Maslow's Hierarchy, which does imply that lower concerns such as health and security must be reasonably safe before people will pay serious attention to the higher possibilities.

The Leadership Challenges

James Kouzes and Barry Posner developed a survey (The Leadership Practices Inventory) that asked people which, of a list of common characteristics of leaders, were, in their experiences of being led by others, the seven top things they look for, admire and would willingly follow. And over twenty years, they managed ask this of seventy five thousand people.

The results of the study showed that people preferred the following characteristics, in order:

- Honest
- Forward-looking
- Competent
- Inspiring
- Intelligent
- Fair-minded
- Broad-minded
- Supportive
- Straightforward
- Dependable
- Cooperative
- Determined
- Imaginative
- Ambitious
- Courageous
- Caring
- Mature
- Loyal
- Self-controlled
- Independent

The main part of the book discusses the five actions that Kouzes and Posner identify as key

for successful leadership:

Model the way

Modeling means going first, living the behaviors you want others to adopt. This is leading from the front. People will not believe what they hear leaders say but what they see leader consistently do.

Inspire a shared vision

People are motivated most not by fear or reward, but by ideas that capture their imagination. Note that this is not so much about having a vision, but communicating it so effectively that others can take as their own.

Challenge the process

Leaders thrive on and learn from adversity and difficult situations. They are early adopters of innovation.

Enable others to act

Encouragement and exhortation is not enough. People must feel able to act and then must have the ability to put their ideas into action.

Encourage the heart

People act the best when they are passionate about what they are doing. Leaders unleash the enthusiasm of their followers this with stories and passions of their own.

Overall, it is difficult to ignore the combined views of 75,000 people. The placing of honesty first is notable and highlights the importance of telling the truth to those they would lead. The overall process identified is clearly transformational in style, which again has a strong focus on followers.

Mathematical model for Leadership

Leadership is a combination of the qualities of leader, the followers and the situation. Effective leader is one who is able to handle every kind of situation with relative ease and is able to keep his/her team motivated. The ideal leader is one who is able to motivate every individual of every team to work with their best of ability. If we are able to calculate the ability of the leader and motivation we will be able to analyze the impact of leadership under different situations. The Study attempts to provide a model for calculating the impact of leadership and the ability of a leader.

Management is a field that covers organization theory and behavior, planning, decision making, various techniques of “management science”, e.g. path analysis, personnel administration, leadership, motivation, communication, management information system, budgeting, auditing, productivity and occasionally, marketing.

Organized activity is given direction and channelized by means of effective leadership. Misdirected or direction-less activity ends up being a purposeless one too. Since administration and organization are all purpose-bound activities, an agency needs to be set up to ensure it does

not go astray. Leadership serves as the desired institution.

In an organization, output is dependent upon several interdisciplinary forces. Leadership is defined as the activity "of influencing and energizing people" to cooperate towards some goal which they come to find desirable or are established as objectives to be pursued collectively[5, 6.]

Heresy and Blanchard define leadership as a function of the leader, followers and situation, which can be depicted as: -

$$L = f(l, f, s)$$

Where L denotes the function of leadership, l of leader, f of followers and s of situation; f stands for function.

- **Leadership** at different times involves
- **Influencing,** which lays an indirect and often imperceptible impact on the subject, so as to get him around to one's view
- **Persuading,** which is understood as a skillful act involving 'pressing' suggestions which is used for obviating /settling conflict or proffering a point of view
- **Directing,** which is an objective/practical methodology of demanding more than commanding compliance
- **Energizing,** which involves motivating, which in turn includes injecting a sense of optimism and heightened 'valence' and 'expectation';
- **Guiding,** to ensure minimum of aberrations and smooth operation of business.
- **Integrating,** which is explained in terms of structural- functional coordination and also the fusion process partaking inside organizations, which comprises of the twin processes of personalization and socialization The two have to be integrated /managed.

There forces should be synergized in a manner that the productivity is optimized. The organization requires a leader, who must motivate the teams and their members. The smartness of the leader should be such that he/she motivates every individual of every team to work with their best ability. The leadership person value of such a man is estimated highest.

There may be another situation that every team works independently and casually. The productivity of such working culture is poor and the value of leadership is lowest. For the purpose of study this value can be assumed to be 'zero' - representing a poor or even working without leader in the organization. It has been observed that sometimes the presence of a leader itself negatively affects working because of the directing, unskillful or in integrative behavior of the leader. This affects adversely in the production.

3. NK model / Kauffman model

A mathematical model is proposed to develop for the leadership in an organization. Where there are M teams each headed by an in charge of the team. It is further assumed that there are P workers in each team. It is assumed that the input raw material is of quality and is fully utilized. For

such models Kaufman carried out a study in 1987[67].

NK model developed by Kauffman and Levin (1987) for studying genome evolution, Solow et at. (2002) applied the model to the process of replacing members of a team. In the paper of Solow and Leenaworng they studied the role of a leader in achieving cooperation among the team members. Leader shows the impact on the team's performance.

Organization measures the various roles of a leader in different situations. It is obvious that the most important role is that of motivation. Organization tries to compare between the performance of team, with and without the leadership. a model includes controllable parameters, whose values reflect the amount of interdependence among team members as well as the skill of the leader and variability.

The mathematical model was developed on the basis of following variables improvement of output with the skill of leader.

Leaders with motivational skill improve interdependence amongst workers, and this improves performance for better output, leader should have skills and availabilities.

Important ability of leader is to prepare PERT for all the teams. For the completion of the chart and then sequence them for execution, this role thus may come important as working scenario imagined and prepare in advance. This can be met only by an intelligent and experienced leader.

4. MATHEMATICAL ANALYSIS OF LEADERSHIP

A. LEADER'S ROLE AND WORK

As per NK model, he/she should have appreciation for the work of each team, their ability to work and he/she should know the time of production in each quanta time. A skill-full leader prepares chart for PERT while allotting the job to teams. He has to meditative people to its highest level. So that the assignment will be completed in the prescribe time. A very important factor is generation of the motivation by rumors among the workers. Hence one of the very important roles of leader is not to allow any rumor to spread in[68].

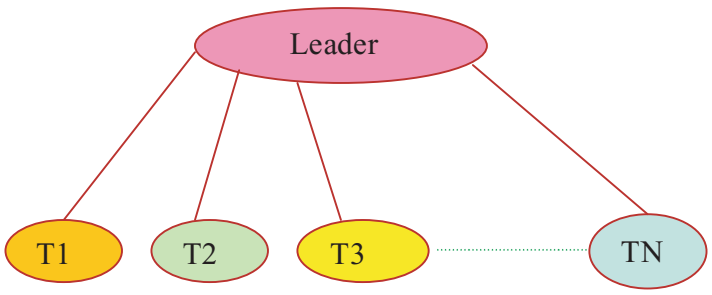


Figure-1 Relationship between Leader and teams

Hence, he/she is an important member of the organization and has to participate in

- Human response management.

- Motivating the teams
- Networking the team work
- Activate traditional activities

B. WORKING ABILITY OF LEADER

Different kinds of working abilities are required for different types of production. The PIPE-LINE technique is such that parallel working is arranged amongst the team. The system may be such that every member of all teams is involved or it is such that a few are spared not to participate in the work. If second system is observed then, the team member those are spared are stand by and are used for reinforced motivation. The second one is better working system. If the first team starts the job and pass on to next after completion to second working team place after the completion the job of second -the job moves to third and so on. Thus we see that after one cycle every team is busy on the job[69].

This generated work schedule is called PIPELINE and works on parallel. It shows in figure 2.

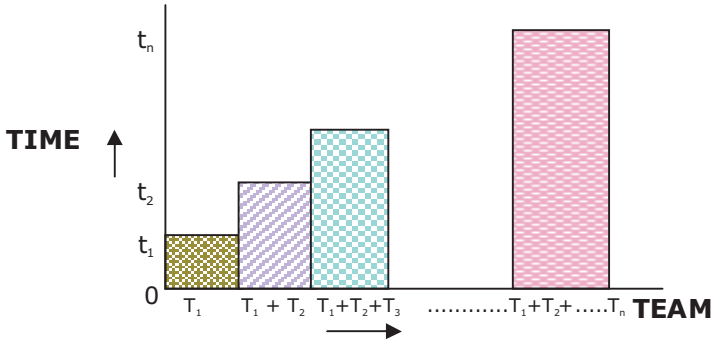


Fig. 2 Pipe line works on Parallel.

The busy timings----

Team T1=M1

T2=M1+M2

T3=M+M+M

.

.

.

.

TN=M1+M2.....+MN

Where,

T1 = Time & M1+M2.....+MN = Work force

And the first model of the product will be in the market after time of T_N. then the model will come at the end of each quanta time of T working will come at the end of each quanta time of T

working after T_N time.

Let total working period is τ

Then the number of production = $\frac{[\tau - T_N]}{T}$

Where,

T_N = time at nth minutes

The technique will involve everyone to become busy in productivity of the organization- this will be the case in which describe the leader's value is highest.

If presumed the motivational value good. In case there is lacking in motivational value, the working quanta time will be enhanced[66].

The motivation value is quantified[1].

Mot. = $p \log p$

Where,

p = joint impact of N_b, P_b AND R_b.

Where, N_b = Need Based Motivation,

P_b = Process based Motivation,

R_b = Reinforcement Based Motivation.

If there is a slack in parameters of motivation - Mot. will be reduced, causing enhancement in time T to (T+∇T)

This makes the overall increase in time for some production as given below ------

$$\phi = \frac{(\tau - T_N)\Delta t}{T}$$

This leads to a loss of products

$$\textbf{Production loss} = \frac{(\tau - T_N)}{T}\Delta t$$

The present fall in ability of the leader, if it is assumed to be one ------

$$= \frac{\Delta t\ (\tau - T_N)/T^2}{(\tau - T_N)/T} = \frac{\Delta t}{T}$$

$$\textbf{Ability fall of Leader} = \frac{\Delta t}{T}$$

The working ability of leader if motivation is not paid attention.

$$\textbf{Fall in ability} = \left(1 - \frac{\Delta t}{T}\right)$$

C. COMPARISON OF LEADER'S ABILITY

In the previous section it is assumed that the ability value is one for a good leader. If the leader has not paid in any output is affected and it falls down. Actually the ability factor may not be unity in most of cases of leaders. Otherwise it varies in day to day working .hence it is important to define it quantitatively and assign the unit if possible. let the work of some organization are x(1),x(2),.....x(365).on first day, second day to 365th day.

The yearly output = $\sum_{i-1}^{365} x(i)$

The average output = $\frac{1}{365} \sum_{i-1}^{365} x(i)$

If the output is enhanced if leader is changed and the response becomes

$$= \frac{1}{365} \sum_{i-1}^{365} y(i)$$

There are three possible conditions -- If,

1) $\frac{1}{365} \sum_{i-1}^{365} x(i) = \frac{1}{365} \sum_{i-1}^{365} y(i)$

Then both leaders have same ability—

2) $\frac{1}{365} \sum_{i-1}^{365} x(i) > \frac{1}{365} \sum_{i-1}^{365} y(i)$

Then earlier is better leader—

3) $\frac{1}{365} \sum_{i-1}^{365} x(i) < \frac{1}{365} \sum_{i-1}^{365} y(i)$

Then the second one is better.

The ability term can be estimated from the roles of leaders performing as a leader, and becoming failure in some activities of the constituents, let the probability of failure is 'f', and then the ability can be expressed as.

$$A_b = (1 + f \log f)$$

Where,

A_b = Ability of a Leader

At limiting case when 'f' tends to zero,

$$f \log f = 0 \quad \text{(By L Hospital's rule)}$$

$$A_b = 1, \quad \text{And its unit is } \textbf{(1-entropy)}$$

D. CIRCUMSTANTIAL IMPACT ON LEADER[3]

If the work is for long duration, then there are chances for catastrophe for the system to be forced. These unexpected situations cause damage in the output. The outputs of such phenomena are used to be impulse, while the damage impact used to be either linear or negative exponential as shown in the figure.

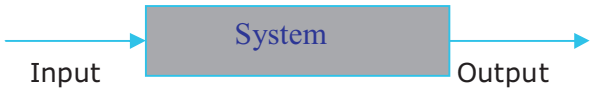


Figure: 3. Impact of unexpected catastrophe input.

Here, the Cat-tropical input used to be impulsive and, this will have negative exponentional or linear drop in the output.

After some time, there is recovery in the output. The recovery may linear or exponential. In fig 4, envisage the damage occurs due to incompetent impact of the leadership. There are two parts in the graph where the first part decreases exponentially in the production. When the value of the production reaches to R_K, the recovery in production starts and obviously the rise follows positive exponential growth. The mathematical model for the fall and rise for such cases are describes.

If the production goes down from R_K it occur crisis. The graph describes others situation to where fall of production is linear (such type case rarely occurs). It is most unnatural but need to be studies. When the production reaches to R_K value there is a sudden change in recovery which also follow linear rise.

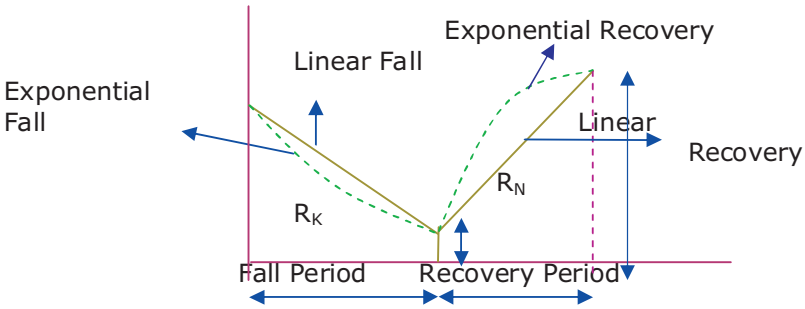


Fig.4. Exponential and Linear Fall and Recovery graph

Damage in exponential fall[2,3]:

If the normal output is expressed as 'RN' and the fall component is α

Then the product or output of a leader after time $t_F = R_N . e^{-\alpha t_F}$

The damage due to leader during fall time = $= \int_0^{t_F} R_N . e^{-\alpha t_F} dt$

Damage in exponential recovery:

This is an area covered by the rising curve $= \int_0^{t_F} R_N \quad (1-e^{\alpha t_F}) dt$

The total damage due to catastrophic impulse

$$= R_N \left[\int_0^{t_F} e^{-\alpha t} dt + \int_{t_F}^{t_R} (1 - e^{\alpha t}) dt \right] = R_N \left[-\frac{1}{\alpha} . e^{-\alpha t_F} \right]_0^{t_F} + \left[t_R - \frac{e^{\alpha t_F}}{\alpha} \right]_{t_F}^{t_R}$$

$$= R_N \left[\frac{1}{\alpha} - \frac{e^{-\alpha t_F}}{\alpha} \right] + \left[(t_R - t_F) - \frac{e^{\alpha t_R}}{\alpha} + \frac{e^{\alpha t_F}}{\alpha} \right]_{t_F}^{t_R}$$

$$= R_N \left[\frac{1}{\alpha} - \frac{e^{-\alpha t_F}}{\alpha} + t_R - t_F + \frac{e^{\alpha t_R}}{\alpha} - \frac{e^{\alpha t_F}}{\alpha} \right]$$

$$= R_N \left[(\frac{1}{\alpha} + t_R - t_F) + (\frac{e^{\alpha t_R}}{\alpha} - \frac{e^{-\alpha t_F}}{\alpha} - \frac{e^{\alpha t_F}}{\alpha} \right]$$

$$= R_N \left[\frac{1}{\alpha} + t_R - t_F + \frac{1}{\alpha} (e^{\alpha t_R} - e^{-\alpha t_F} - e^{\alpha t_F} \right]$$

Hence,

Damage $= R_N \left[\frac{1}{\alpha} (t_R + t_F) R_N \left[\frac{1}{\alpha} + t_R - t_F + \frac{1}{\alpha} (e^{-\alpha t_R} - 2(\frac{e^{-\alpha t_F} + e^{\alpha t_F}}{2})) \right] \right.$

$$= R_N \left[(t_R + t_F) \; R_N \left[\frac{1}{\alpha} + (t_R - t_F) + \frac{1}{\alpha} (e^{\alpha t_R} - 2\sin \alpha t_F) \right] \right.$$

$$= R_N \left[(t_R + t_F) - \left[\frac{1}{\alpha} + t_R - t_F + \frac{1}{\alpha} (e^{\alpha t_R} - 2\sin \alpha t_F) \right] \right.$$

$$= R_N \left[t_F + t_R - \frac{1}{\alpha} - t_R - t_F - \frac{1}{\alpha} (e^{\alpha t_R} - 2\sin \alpha t_F) \right]$$

$$= R_N \left[2 t_F - \frac{1}{\alpha} (1 + (e^{\alpha t_R} - 2\sin \alpha t_F)) \right]$$

Total Damage or Output due to Leader's Effect

$$= R_N \left[2\, t_F - \frac{1}{\alpha} \left(1 + e^{\alpha t_R} - 2\sin^{\alpha t_F}\right) \right]$$

Ability Factor (AF) of the Leader $= \dfrac{\text{Amount Of Damage}}{\text{Expected Work}}$

$$= \frac{R_N \left[2\, t_F - \frac{1}{\alpha} \left(1 + e^{\alpha t_R} - 2\sin^{\alpha t_F}\right) \right]}{R_N (t_F + t_R)}$$

$$\textbf{AF} = \frac{\left[2\, t_F - \frac{1}{\alpha} \left(1 + e^{\alpha t_R} - 2\sin^{\alpha t_F}\right) \right]}{(t_F + t_R)}$$

Similarly if they consider damage part to be linear and recovery is also linear, than the amount of damage can be estimated as D_L (Damage Linear)

Amount OF Linear Damage $= R_N\ (t_R) \left[\dfrac{R_N + R_K}{2}\, t_F \right] + \dfrac{R_N + R_K}{2}\ (t_R - t_R)$

$$= R_N\ (t_R) \left[\frac{R_N + R_K}{2} \right] + \left[\frac{R_N + R_K}{2}\, t_R \right] - \left[\frac{R_N + R_K}{2}\, t_R \right]$$

$$= \frac{R_N + t_R}{2}\, t_F \quad \left[R_N + t_F - 1 \right] + \frac{R_N + R_K}{2}\, t_R$$

Damage $= \dfrac{R_N + R_K}{2} \left[t_F\, (R_N + t_R - 1) \right] + t_R$

Where, $= R_K = R_N - t_F \cot\theta$

Where, θ = Fall Angle

Catastrophic impact is beyond and simply circumstantial and it has taken place and beyond control.

The leader has to maintain encourage environment with worker on such situation.

E. CONCLUSION & SUGGESTION

Instead of assuming that the administrator ought to conform to what the institution demands, it is more accurate to say that the institution is more in the process of adjusting to what the leadership wants. An organization is forever subject to change and it is the executive that is in the process of engineering most of this change. If employees are given a free environment, we would get a much more fundamental type of institutional loyalty as an unsolicited by product. The modern trend in administration is to administer by objectives not orders….individuals are bound together by ideas and not by coercive authority and this atmosphere is what (arguably) produces efficiency in the long run.

"The job of leader is to define reality and give hope-" so said a chief business advisor to President George Bush while thanking him for his astute handling of post September 11 situation in America. It is being strongly felt in America that President Bush is very much in the process of redefining leadership. He has proved to be the man for the occasion and it should not be forgotten that he is the same man who was dismissed for lack of charisma just some time ago. What then is leadership? The answer may not be readily forthcoming.

A leader is not a superman, nor is he expected to be one. He is neither a layman. So what makes a leader? Vedanta talks of a Kshatritya who is a born leader. He is healthily endowed with Sattvo-Rajas qualities and is born to determine destinies of ordinary mortals. The male archetype is Arjuna who fights on behalf of good against evil. Does the Gita then subscribe to the traitist theory of leadership? The question demands an answer. Given the veracity of ancient wisdom, as proven from time to time, the issue needs to be investigated in all seriousness.

The above study gives the picture of the impact in the production of the involvement of the leader who is managing the organization. A minor laxity on the duty or a little slackness in execution of order causes fall in the output. His/her alertness gains the normality in working.

Due to this phenomenon there is damage in production. Study has been carried out for evaluating the loss when loss and gain curves are exponentially distributed.

F. COMPUTER BASED PROGRAMME FOR ABOVE EQUATIONS

Fall & Recovery of Leadership Program

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#define e 2.78
void main()
{
 float h,total_area,alpha,y0,y1,y2,y3,y4,y5,y6,y7,y8,y9;
 float rk,rn,tf,tr,fall,falldu2damage;
 float damagedu2falltime,exponential_recovery;
 clrscr();
 printf("enter the value of rk,rn,tf,tr\n");
scanf("\n%f\n%f\n%f\n%f",&rk,&rn,&tf,&tr);
 fall=(rk+rn)/2*(tf-tr);
 printf("\nfall=%f",fall);
 printf("\nenter the value of h=");
 scanf("%f",&h);
 printf("enter the value of alpha=");
 scanf("%f",&alpha);
 y0=exp(-alpha*0);
 y1=exp(-alpha*1);
 y2=exp(-alpha*2);
 y3=exp(-alpha*3);
 y4=exp(-alpha*4);
 y5=exp(-alpha*5);
 y6=exp(-alpha*6);
 y7=exp(-alpha*7);
 y8=exp(-alpha*8);
 y9=exp(-alpha*9);
 printf("\n--------According To Trapozoidal Rule--------\n");
```

```
total_area=h/2*((y0-y9)+(y1+y2+y3+y4+y5+y6+y7+y8));
//damage=(h/2)*((1/exp(1)-1/exp(5))+2*(1/exp(2)+1/exp(3)+1/exp(4)));
 printf("\n Total Area=%f\n",total_area);
 damagedu2falltime=rn*total_area;
 printf("\n Damage due to fall time=%f",damagedu2falltime);
 falldu2damage=fall+total_area;
 printf("\n\nfalldu2damage=%f\n",falldu2damage);
 printf("\n--------damage in exponential recovery--------\n");
 exponential_recovery=(1-total_area)*rn;
 printf("\n Damage in exponential recovery=%f",exponential_recovery);
 getch();
 }
```

```
/*comparision of leaders ability*/
#include <stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
float average_output,enhanced_output,x,y,sum=0;
clrscr();
printf("\n\n yearly output");
printf("\n*****************\n");
for(x=0;x<=365;x++)
{
sum=sum+x;
}
printf("\n sum= %f",sum);
average_output=sum/365;
printf("\n average output=%f",average_output);
printf("\n\n enhanced output");
printf("\n*****************\n");
for(y=0;y<=365;y++)
{
sum=sum+y;
}
printf("\nsum= %f",sum);
enhanced_output=sum/365;
printf("\n enhanced output= %f",enhanced_output);
if(average_output == enhanced_output)
 {
printf("\n\n -------both are good-------");
 }
else
```

```
if(average_output > enhanced_output)
{
printf("\n\n -------average output is good-------");
}
else
if(average_output < enhanced_output)
{
printf("\n\n------- enhanced output is good-------");
  }
 getch();
        }
```

Part V

MATHEMATICAL MODEL FOR CRISIS ESTIMATION & IT'S MANAGEMENT

CHAPTER 5

MATHEMATICAL MODEL FOR CRISIS ESTIMATION & IT'S MANAGEMENT

A. INTRODUCTION

Crisis literally means an "emergency" or "urgency". Crisis is also defined as "such events which act as a turning point for better or worse"[70].

The word crisis comes from the Greek word 'Krisis' which means differentiation or decision1. Although in legal spheres the term was used to describe the differentiation between just and unjust, the meaning varied when used in medical, political and economical context.

The late US President John F. Kennedy noted, "When written in Chinese, the word crisis is composed of two characters - one represents danger and the other represents opportunity"[71.]

Many researchers and scholars over the years have tried to define crisis and crisis situation. While Pauchant and Mitroff[3] believe that a crisis is a "disruption that physically affects a system as a whole and threatens its basic assumptions, its subjective sense of self, and its existential core"; Fink (1986), Kash and Darling (1998) add that a crisis is referred to as an unplanned event emerging from the internal or external environment of an organisation, region or country which can disrupt operations, threaten people physically and mentally, and endanger the viability of entities no longer able to cope with the situation using normal managerial producers. Dirk Glaesser tries to understand 'as a dangerous and extraordinary situation in which a decision must be made under time pressure. He further states that crisis is seen as a critical change in important variables that endanger or destroy either parts of or the entire system[72, 73].

Selbst[1] on the other hand, defines a crisis as "any action of failure to act that interferes with an organisation's ongoing functions, the acceptable attainment of its objectives, its viability or survival, or that has a detrimental personal effect as perceived by the majority of its employees, clients or constituents."

Faulkner observed that in the above definition of crisis Selbst (1978) has mentioned two

things- first there has been inaction on the part of the organisation. Secondly, the crisis has a negative effect. But we need to remember that most of the crisis hitting the Tourism Sector is not due to the organisational inaction but it occurs "all of a sudden", "unexpectedly". At times there is momentary inaction on the part of the organisation when some new and totally unexpected crisis happens like 9/11 or Tsunami.

Brent on the other hand reflects that Selbst definition focuses on perception and we should focus on the perception management when we go for any crisis management strategies[75, 76].

John M Penrose also talks about perception of a crisis. He states that the perception of crises may ultimately affect crisis outcomes. Furthermore, the perception of a crisis as an opportunity or a threat may also have significant implications. Crises are not inherently good or bad; they are merely perceived by most as bad.

Booth[8] describes crisis as "a situation faced by an individual, group or organisation which they are unable to cope with by the use of normal routine procedures and in which stress is created by sudden change".

According to David Beirman [78, 79] "A crisis is a situation requiring radical management action in response to events beyond the internal control of the organisation, necessitating urgent adoption of marketing and operational practices to restore the confidence of employees, associated enterprises and consumers in the viability of the destination."

Debbie Hindle[79] of bgb communications believes that a crisis is something that hits us unexpectedly. Something that requires instant attention along with huge investments in time, people and resources.

J. Spengler[80] suggested that "A crisis is an emergency or significant critical event that must be planned for proactively and can often be dealt with by the affected organisation."

"Crises can also be described as the possible but unexpected result of management failures that are concerned with the future course of events set in motion by human action or inaction precipitating the event. Events of this type include the Foot and Mouth outbreak on UK farms in 2001, the Chernoby Disaster and the Exxon Valdez oil tanker wreck. Examples of crises that may occur at some point in the future include:

- The impact of AIDS particularly in Sub-Saharan Africa and potentially in the Indian subcontinent and the Russian Federation;
- An increase in militant religious fundamentalism;
- Nuclear war in Asia;
- Financial meltdowns including global recession; and
- Terrorism employed to achieve political or religious objectives"[81].

Although we are talking about crisis now, the concept of crisis research is prevalent in

other sectors. As Glaesser states in his book, Crisis was a term initially used with national economics. The various approaches within crisis research can be seen in the following diagram given by Glaesser[82].

	System Oriented Approaches	Decision oriented Approaches
Individual Models	Medicine: Turning point is the decision between life and death during the course of an illness	Individual cognitive problem solving qualities of decision makers in crisis situation
	Psychology: Perception of an occurrence or situation as an intolerable difficulty which exceeds a person's resources and coping mechanisms. Failure of behavioural patters Danger of identity loss	
Collective models	Social sciences Crises as phenomena of societies endangered national interest during conflict due to a threatening escalation towards war (e.g. Cuban crisis) Crisis as phenomena of societal subsystems: Politics real changes to the patterns of political relations (e.g. coup. revolution) Economy exogenous economic shocks, phases of down ward trends in the economic cycle.	Collective decision behaviour in crisis situations

Source: Board on Linde (1994)

Fig: Areas of knowledge within crisis research

Glaesser[83] defines crisis as an undesired, extraordinary, often unexpected and timely limited process with ambivalent development possibilities. It demands immediate decisions and counter measures in order to influence the further development again positively for the organisation (destination) and to limit negative consequences as much as possible.

A crisis situation is determined by evaluating the seriousness of the occurring negative events, which threaten, weaken or destroy competitive advantages or important goals of the

organisation. Term crisis is often used along with disaster. There have been many attempts to define both separately as different entities whereas at times they have been used collectively or may be as synonymous.

Disasters[84] can be described as unpredictable, catastrophic change that can normally only be responded to after the event, either by developing contingency plans already in place or through reactive response. Events of this nature occur regularly but at undeterminable frequency, intensity and location. Examples of future disasters that the production sector could begin to prepare for include:

- Natural disasters of all types including floods, droughts and earthquakes;
- Long term natural climate change separate form the current concern over human induced global warming; and
- A pandemic perhaps caused by a new strain of flu or other unknown disease.

Bob McKercher[85] says that crisis and disaster represent “different sides of the same coin”. While at time they are also used as synonyms. He further states that people often use the terms collectively to avoid making an arbitrary distinction between the two.

On the other hand J. Spengler[86] states that a crisis is an emergency or significant critical event that must be planned for proactively and can often be dealt with by the affected organization.A disaster is a critical event that often requires outside assistance. A disaster is usually broader in scope.

A Hazard is something that holds the potential to cause harm.

Risk is the likelihood or probability of harm

Joan Henderson[86,87] claims that there is no clear distinction between a crisis and disaster. She adds that disasters can evolve in to crisis if not managed effectively. Faulkner states that it is very difficult to empirically identify either crisis or disaster. He further states that from organizational point of view, crisis and disasters are very similar, what is distinguishable between them is the causes of the situation, while crisis represent situation where causes of the problem are associated with the on-going change and the failure of the organizations to adopt to this. While disasters are triggered by sudden events over which the organization has relatively little control.

According to Faulkner[87] a 'crisis' describes a situation “where the root of an event is, to some extent, self- inflicted through such problems as inept management structures and practices or a failure to adapt to change”, while a “disaster can be defined as “where an enterprise… is confronted with sudden unpredictable catastrophic changes over which it has little control.”

Faulkner has also given a spectrum of events with crisis located at one extreme and disaster the other.

Chernobyl	Kobe Earthquake
Exxon Valdez	Lockerbie
Swiss Canyon	Katherine Flood
Incident	(Australia)

Bob McKrecher[88] considers the connection between crisis and disaster like that of "two sides of the same coin". But he also goes on to add that distinction between the two is based in the nature of cause and effect. He says "Crisi is the single event that may or may not cause a disaster. A disaster on the other hand is usually the outcome of some crisis." He makes it clear that events like flood, Tsunami, Terrorist attacks are events, which are separated from crisis or disaster. Handling of some events based on preparation or response determines whether it is a disaster or a crisis. He further gives the example of an airlines crash, an event.

This gives rise to crisis situation but how effectively airlines handle this crisis can stop a disaster from happening. He states that "at times there is a clear line link between the two, while at other time they occurs simultaneously. One of the things to realize is that crisis is quite different from a management perspective than from an individual perspective."

"A crisis is essentially a period of uncertainty which is unexpected and has an unknown conclusion." This is the definition put forward by Mary Lynch[89]

Several other authors have attempts to distill the essential characteristics of disaster or crisis situation (Fink, 1986, p. 20; Keown-McMullan, 1997, P-9; Weiner and Kahn, 1972, p.21). A synthesis of these contributions produces the following key ingredients[90].

- Triggering event, which is so significant that it challenges the existing structure, routine operations or survival of the organization.
- High threat, short decision time and an element of surprise and urgency.
- A perception of an inability to cope among those directly affected.
- A turning point, when decisive change, which may have both positive and negative connotations, is imminent. As Keown McMillan (1997, p.9) emphasizes, "even if the crisis is successfully managed , the organization will have undergone significant change."
- Characterized by fluid, unstable, dynamic, situations (Frank, 1986, p.20).

Faulkner also talks about another approach to defining disasters, as provided by Keller and Al –Madhuri (1996, p.20), who applied arbitrarystatistical benchmarks. Thus, disasters were defined in terms of a threshold number of fatalities (10); damage costs (US$1 million) and number

of people evacuated (50). But this method is usually used for statistical purpose, and is not of that much use qualitative study.

Risk on the other hand is the possibility of loss or injury[91].

Risk management is an establishment part of the organizational management. But crisis management is still relatively unexplored area, probably because study of organizational crisis involves multiple disciplines. In business, if we can anticipate a crisis it would be less traumatic and less expensive.

According to Kash and Darling[92], crisis often have negative consequences including a decrease in demand and revenues, rising costs, the disruption of normal operations, failings in decision making and communication activities, staff lay-offs, the cancellation of investments, stressful living and working environments, and the closure of organizations. At the same time, such events may also offer opportunities to introduce new products, management programs, new markets and ways to reduce costs.

Again the question of perception of a crisis plays a major role. Opportunities exist within any crisis situation. New leaders may emerge from a crisis, and in most cases, a crisis leads to accelerated change in business processes that may prove advantageous in the long run[93].

Often companies that do survive disasters are more prepared for the next one. This thought does depend, however, on the extent of learning that the company in question absorbs from the event. Finally, companies that do handle a crisis effectively are generally perceived in a more positive way[94]. Many companies simply fail to identify these potential positive outcomes.

The perception of a crisis as an opportunity should lead to an increased ability to consider various alternatives and thus a greater extent of proactive planning. Managers generally view opportunistic situations to be more controllable, thus including more members in to the resolution process and thereby increasing the flow of alternatives[95]. On the other hand, the perceiving of a crisis as a threat will cause managers to limit the amount of information they consider. Thus, perception has the potential to influence the extent to which an organization is willing to engage in crisis management activities[96].

Other than the fact that perception changes the quality of crisis – whether it is negative or positive, these exists another characteristics of crisis- the development possibility over the course of time. Glaesser97 says “this process character is marked, on the one hand, by its temporal limitations and on the other hand by its ambivalence. The latter is a prerequisite for the actual crisis management, that is, the sensibleness of the use of counter measures. Only after the so called turning point of the crisis can it be decided whether the previously ambivalent crisis situation will take a clearly positive or negative course”.

Glaesser also talks about two other characteristics of a crisis. He says “Crisis are characterized by extremely badly structured decisions that can be traced back to information

deficit or even too much information, restrictions on information processing complexity, etc". He also adds that "Crisis is an exceptional situation, the onset of which is uncertain. Consequently, all preparation with regard to negative events have only eventuality as a characteristics".

A compilation of the thoughts of eminent scholars on the definition of crisis show cases quite a few variations as well as similarities. Although the different situations give different meaning to crisis, we find that 'Crisis" –

- Can be faced by an individual, group or organization;
- Is a sudden and unexpected event;
- Is an event beyond 'normal' or routine conditions with mostly unknown conclusions;
- Affects the basic core, physical system and routine functioning of the organization;
- At times is due to the inaction of the organizational mismanagement and failure to change i.e. adopt change;
- Is also caused due to events and actions beyond the control of an organization;
- Is perceived both by the people within the crisis situation as well as people not directly connected with the crisis situation;
- Perception of the situation decides whether the crisis is good or bad. Perception plays an important role in managing the crisis;
- Does not necessarily results in negative impact but the handling of the situation would decide how it would affect the eventuality;
- Can occur in any and every organization and can affect every industry and place, irrespective of how small or big the organization or destination is;
- Can only be handled by planning beforehand yet at times long term plans do not always work out during the crisis period; and
- Is beyond the immediate control of the management and necessitates some extra attention, efforts, investment and operational practices.

For the purpose of this **"Study"** we will only be discussing those crises which are felt / experienced by an organization / production unit.

Therefore, from the above we can define crisis as "unexpected or sudden change in the physical system or working environment of an organization that hampers its routine functions and affects the longtime goals; and requires extra efforts to overcome the situation which eventually results in either better or worse situation than before (for the organization)".

In other words, "Crisis is a sudden or unexpected event that affects the physical system of an organization and extra efforts, investments are put in which eventually shows positive or negative impact". This means, once the crisis situation is over, it would bring about a change, some type of impact on the destination/organization in crisis.

This is the reason we require crisis management. In production or service industry, we

have seen destinations, suffering due to one crisis situation or other. Crisis management strategies are needed to be used during these crisis situations to help retain the workers' confidence as well as the confidence of the production / service industry and thus minimize the impact of the crisis situation on the destination. To formulate crisis management strategies, as understanding of the nature of crisis and its types in production/ service is required to be analysed.

B. NATURE AND COMPONENTS OF CRISIS:

Crisis situation are unexpected or sudden in nature. At times some crisis situation are expected for e.g.- war after prolonged tension. Yet one cannot be certain when the war will actually take place or for how long the war will go on.

Similarly, crisis affects the routine functions which means crisis situations are extra ordinary in nature or else create extra ordinary situations.

The crisis differs from person to person, organization to organization and from unit to unit. In today's world, disasters and crisis doing recognize international borders and affects all.

Although the crisis nature varies from one crisis to another, it has observed that mostly crisis follows certain pattern. This pattern has been identified as the life cycle of crisis situation.

In illustration 2.3, there are some important similarities in terms of assumptions and recommendations. They recommended actions in four or five main stages: pre-crisis, acute crisis, chronic crisis, and resolution. In the first stage, there are important duties to carry out, such as analyzing the external environment as an ongoing process, collecting data, interpreting the signals, making plans, forming a team, and establishing communication channels. The second begins when the symptoms of crisis become apparent. At this stage, the extent of the event and its immediate and long terms effects should be assessed and appropriate measures should be taken immediately. During the third, the symptoms and impact of the event become more obvious than before, and it becomes essentials to respond to them with appropriate actions. In the final stage, the symptoms of the crisis may gradually disappear and operations begin to return to normal. It is also possible that the actions to deal with the situation may not work, that further difficulties may be faced, and that the situation may worsen.

Faulkner's (2001) stages	Fink's (1986) stages	Roberts (1994) stages
1. Pre-event		Pre-event: where action can be taken to prevent disasters (e.g.) growth management planning or plans aimed at mitigating the effects of potential disasters.
2. Prodronal	Prodronal Stage: when it becomes apparent that the crisis is inevitable	

3. Emergency	Acute stage: the point of no return when the crisis has hit and damage limitation is the main objective	Emergency phase: When the effect of the disaster has been felt and action has to be taken to rescue people and property
4. Intermediate		Intermediate phase: when the short term needs of the people must be dealt with – restoring utilities and essential services. The objective at this point being to restore the community to normality as quickly as possible.
5. Long term (recovery)	Chronic stage: clean-up, post-mortem, self-analysis and healing	Long term phase: continuation of the previous phase, but items that could not be addressed quickly are attended to at this point (repair of damaged infrastructure, correcting environment problem, counseling victims, reinvestment strategies, debriefings to provide input to revisions of disaster strategies)
6. Resolution	Resolution: routine restored or new improved state.	

Source: Faulkner (2000) P.140

Illustration 2.3: Crisis and disaster lifecycle

These proposed life cycles of the crisis would help the management to formulate strategies based on the stage of the crisis. But as yet it is not possible to exactly identify the stage of crisis we are dealing with. It is important to note here that crises are complex in nature.

Therefore it is better to be prepared for all eventualities. Yet at times such crisis situations occur which were previously unheard of such as 9/11. The question of crisis management then no longer deals with the preparation for an eventually or crisis but how to respond to the crisis in hand. In such a situation it becomes important to know about the various components of a crisis and how to deal with the situation.

Reviews of crises and crisis plans typically include four common elements: the plan, the management team, communication, and post-crisis evaluation. These four components together form the basis of crisis management activities and should figure in to any comprehensive crisis plan.

Glaesser[95] defines crisis as an undesired, extraordinary, often unexpected and timely limited process with ambivalent development possibilities. It demands immediate decisions and counter measures in order to influence the further development again positively for the organisation (destination) and to limit negative consequences as much as possible.

A crisis situation is determined by evaluating the seriousness of the occurring negative events, which threaten, weaken or destroy competitive advantages or important goals of the organisation.

Term crisis is often used along with disaster. There have been many attempts to define both separately as different entities whereas at times they have been used collectively or may be as synonymous. Here one more type of crisis is defining i.e. Impulsive crisis. Here we are defining the term impulsive & impulsive crisis and also formulate how to evaluate the crisis as well as formulate the recovery of the crisis. And then we have found the estimation of the damage due to crisis. In this event we find the two situations i.e. when recovery starts immediately after the crisis & Estimation of Damage when recovery starts after delay.

In this mathematical analysis we have also develop a formula for Loss Estimation due to Crisis.

C. CRISIS /IMPULSIVE CRISIS IN AN ORGANISATION[96]:

The word 'Impulsive' means proceeding from natural feeling or impulse without external stimulus and if we talk in terms of organization then the discussion of crisis is done and its recovery is required to be made, then the important parameter is to identify the damage shape of the crisis. That is called 'Impulsive crises'. This study is limited to impulsive crisis only.

When the damage due to crisis has taken place, it is essential to evaluate the amount of the total damage. The recovery will need to know the value of damage and the new state of the working of an organization. Siomkos, George (1992)[94] describes that recovery of the damage done by the crisis is exponential in terms of time and money.

IMPULSIVE CRISIS AND ITS EVALUATION: -

The impulsive crisis damages suddenly, and brings down the production or its money value from its normal value to new low value. Followings some are the major causes for the impulsive crisis[98]:

a. Outbreaks in the organization.

b. Employees' sabotage/terrorist attack.

c. Fire explosions and chemical spills.

d. Sudden drop in revenue/ Market rate of the shares.

e. Shortage in raw materials/oils/fuel.

f. Natural disaster.

The impact of above happening does impulsive crisis and let the value of organization produce at any time t is Pn(t). Consider the crisis occurs at any time say t, then the value at time **[-τ] = Pn(t).** After the crisis, the value at time **[+τ] = Pc(t).** The fall of the value of the organization output is shown in figure-1.

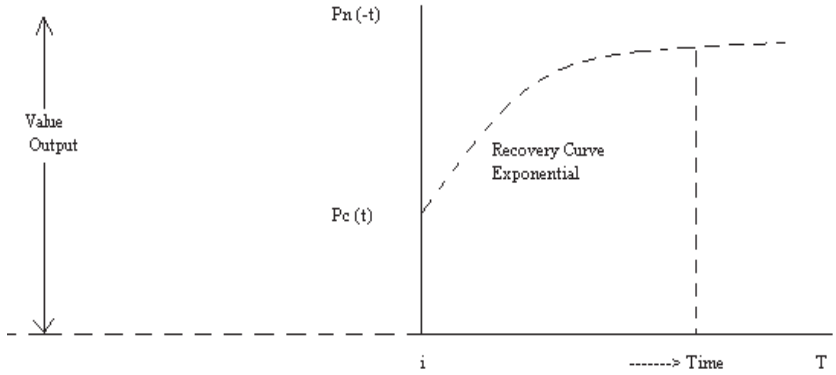


Figure- (1) Happening of crisis & instantaneous application of remedial recovery

The figure envisages:

The value of the organization = $P_n(t)$ **if** $t<\tau$

= $P_c(t)$ **if** $\tau<t<T$

= $P_r(t)$ **if** $t>T$ **.....(1)**

D. RECOVERY CURVE FROM CRISIS[89,90]:

The recovery curve is determined by applying analogy of charging of condenser. The value of the output of the organization between time τ and T is expressed by the equation:

$$P_c(t) = [\{Pn(\tau) - PC(m)\}*(1-e^{-t/k})] \quad . \quad \text{..... (2)}$$

Where,

$P_c(t)$ = value of organization after the crisis at any time t, where τ<t<T.

$P_c(m)$ = the organization value at the instance of maximum damage.

$P_n(t)$ = the normal value of the organization before the occurrence of the crisis.

K = crisis recovery constant

The recovery crisis constant is important parameter to get rid of the damage of the crisis. This depends on many factors such as[95]:

1. Money employed to replace damage it ever and for paying charges of repairs if any.
2. Skilled people carrying out the repair job if any
3. Items availability to replace the broken item.

4. Availability of cranes etc for picking and fitting
5. M/c shops , welding , shaping, cutting , machinery etc if required
6. Fast supply of raw materials
7. Alternative electricity supply

All these factors decide the value of crisis recovery constant. In general if the value of 'k' is small, then recovery from the crisis will be fast. Then we can say that the crisis management time is inversely proportional to the value of k.

Crisis Management Time α (1/k) …… (3)

The above proportionality leads to;

1. **Management is excellent if $0 < k < 0.5$ ……(3.1)**
2. **Management is good if $0.5 < k < 1$ ……(3.2)**
3. **Management is average if $1 < k < 5$ ……(3.3)**
4. **Management is poor if $5 < k$ ……(3.4)**

E. ESTIMATION OF DAMAGE DUE TO CRISIS[96,97]:

There are two possibilities to estimate the damage when crisis recovery is exponential and the recovery process is envisaged in equation (2). The first case when recovery starts just after the happening of impulsive crisis, the other case will be when there is some constant delay in starting of recovery .The damage due to either case is studied as;

When recovery starts immediately after the crisis:

The figure-2 shows graphically the damage caused by impulsive crisis and immediately starts of exponential recovery.

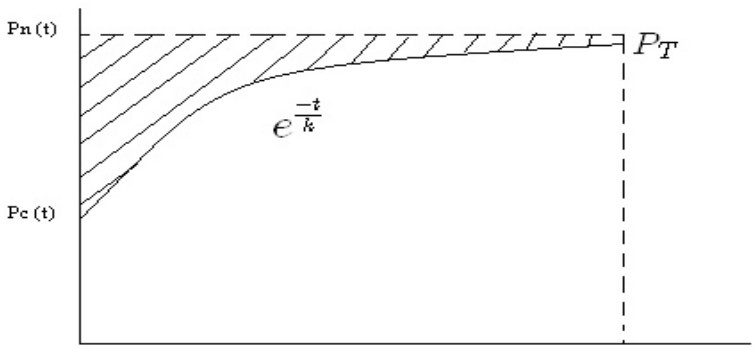


Figure- (2) Shaded area describes the damage.

The hatched area will be the damage caused by the crisis up to time T. Let damage is denoted by Di, then

$$\text{(Damage)}Di = P_n(t)^* T - [P_n(t)-P_c(t)]^* \int_0^T [1-e^{-t/k}]dt \quad ..(4)$$

Where, $P_n(t)$, $P_c(t)$, T and k are known then the damage can be computed.

* This computation has been done by an example in case study portion.

Estimation of Damage when recovery starts after delay

The graphical representation with delay recovery from the damage due to crisis is shown in figure (3).

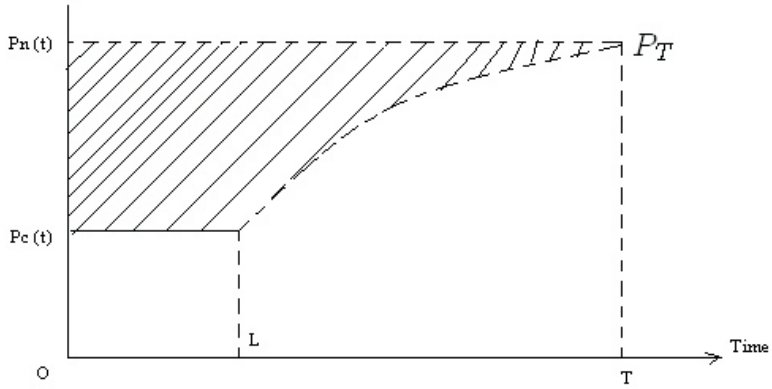


Figure- (3) Shaded area describes damage due to delay in start of recovery

The damage with L time starting late the recovery due to crisis is let given by D_L. Then D_L is given by the following expression:

$$D_L = [P_n(t)-P_c(t)]^*L+\{P_n(t)[T-L]-(P_n(t)-P_c(t)\}^* \int_L^T [1-e^{-t/k}]-(T-L)^*P_c(t)\} \quad .....(5)$$

We hereby plan to compute the damage.

* This computation has been done by an example in case study portion.

**The output values of the organization after remedial services provided,

$$P_r(t) = P_c(t) + [P_n(t) - P_c(t)] * [1-e^{-t/k}]$$

5: Example:

For the following given data in an organization: Calculate-

(1) Output value at different times.

(2) Total damage due to crisis.

- **Normal output per unit time = $P_n(t)$ = 750(Lac.)**
- **Fall in output due to crisis = $P_c(t)$ = 350(Lac.)**

- **Delay in providing recovery service = L = 5(Unit time)**
- **Let the value of recovery constant k = (.5 to 2.5)**

Solution:

The output values of the organization after remedial services provided

$$P_r(t) = P_c(t) + [P_n(t) - P_c(t)] * [1^{-e-t/k}]$$

$$= 350 + [750 - 350] * [1-e^{-t/k}]$$

$$= 350 + 400 * [1-e^{-t/k}]$$

$$= 750 - 400e^{-t/k}$$

Let, **k** = .5, 1.0, 1.5, 2.0, 2.5

The, value calculated for Pr(t) are tabulated in the following tables

S. No.	T	$P_r(t)=750-400e^{-t/k}$
1	0.5	602.88
2	1.0	695.86
3	1.5	730.08
4	2.0	742.68
5	2.5	747.31
6	3.0	749.01
7	3.5	749.64
8	4.0	749.86
9	4.5	749.95
10	5.0	749.98

Table 1: k = .5

S. No.	t	$P_r(t)=750-400e^{-t/k}$
1	0.5	507.39
2	1.0	602.85
3	1.5	660.74
4	2.0	695.87
5	2.5	717.16
6	3.0	730.09
7	3.5	737.92
8	4.0	742.67
9	4.5	745.55
10	5.0	747.30

Table 2: k = 1.0

S. No.	t	$P_r(t)=750-400e^{-t/k}$
1	0.5	462.44
2	1.0	543.25
3	1.5	602.84
4	2.0	644.20
5	2.5	673.94
6	3.0	695.86
7	3.5	711.08
8	4.0	722.02
9	4.5	730.08
10	5.0	735.68

Table 3: k=1.5

Table 4: k = 2.0

S.No.	T	$P_r(t) = 750 - 400e^{-t/k}$
1	0.5	438.48
2	1.0	507.38
3	1.5	561.05
4	2.0	602.84
5	2.5	635.39
6	3.0	660.74
7	3.5	680.49
8	4.0	695.86
9	4.5	707.84
10	5.0	717.16

Table 5: k = 2.5

S. No.	t	$P_r(t) = 750 - 400e^{-t/k}$
1	0.5	422.50
2	1.0	481.87
3	1.5	530.47
4	2.0	570.27
5	2.5	602.84
6	3.0	629.52
7	3.5	651.36
8	4.0	669.24
9	4.5	683.88
10	5.0	695.86

F. A STUDY ON CRISIS ANALYSIS IN DEPARTMENTS OF AN ORGANIZATION

1. Total Crisis based on Crisis in Departments with the help of Boolean algebra[91,94]:

Whenever we talk of management the essential need is to quantify the cause, which becomes the reason of crisis. If this cause is replaced or reinforce the crisis is over.

The main constituents/ Departments of any organization are[95,98]: -

- Human Resource department
- Marketing department
- Production department
- Information Technology department

If crisis occurs in any department, the situation may as given below-

- Human Resource Crisis = H_c

- Marketing Crisis = M_c
- Production Crisis = P_c
- Information Technology Crisis = I_c

If we consider these as variables, then they assume values either ONE or ZERO, representing whether crisis representing whether crisis exist or not.

If we calculate the departmental crisis with the help of **BOOLEAN ALGEBRA,** we can calculate the total crisis. If the study carried out mathematically, then these can be a theorem stating the situation of the organization given as below.

THEOROM: - If there exist a crisis in any constituent, the entire system suffered with crisis.

Proof: - Let the constituent variables are represented as,

- Human Resource Crisis = H_c
- Marketing Crisis = M_c
- Production Crisis = P_c
- Information Technology Crisis = I_c
-

The possible crisis evaluation using **BOOLEAN ALGEBRA** can be given as,

$$\textbf{Crisis 'C'} = H_c + M_c + P_c + I_c + H_c.M_c + H_c.P_c + H_c.I_c + M_c.P_c + M_c.I_c + P_c.I_c + H_c.P_c.I_c + H_c.M_c.I_c + M_c.P_c.I_c + M_c.H_c.P_c.I_c \quad \text{.... (1)}$$

In the Equation (1), Plus Sign (+) represents OR & Dot Sign (.) represents AND of **BOOLEAN ALGEBRA.**

Whenever a crisis occurs in any variables the value of the variables is ONE, otherwise it is ZERO.

If C = 1, Means there is a crisis in the system.

Hence we have to find the value of 'C' equal to ONE.

If & if any variables is equal to ONE, Consider that Hc = 1. This makes the equation.

$$C = 1 + M_c + P_c + I_c + 1.M_c + 1.P_c + 1.I_c + M_c.P_c + M_c.I_c + P_c.I_c + 1.P_c.I_c + 1.M_c.I_c + M_c.P_c.I_c + M_c.1.P_c.I_c$$

$$C = 1 + M_c + P_c + I_c + M_c.P_c + M_c.I_c + P_c.I_c + M_c.P_c.I_c$$

[In Boolean algebra A.A = A]

And in Boolean algebra

$1 + X = 1$

Where, $X = 0$

Or $X = 1$

Then,

$$C = 1 + M_c [1 + P_c + I_c + P_c I_c] + P_c [1 + I_c] + I_c$$

$$= 1 + [M_c + P_c + I_c]$$

$$= 1$$

$$C = 1$$

- If crisis occurs in two departments like Hc & Pc.

$$C = 1+1+ M_c + I_c + M_c + 1 + I_c + M_c + M_c I_c + I_c + M_c + I_c + M_c I_c + M_c I_c.$$

$$= 1 + [M_c + I_c]$$

$$= 1 + X$$

Where, $X = [M_c + I_c]$

$$= 1$$

$$C = 1$$

The 'C' again equal to ONE it means there is a crisis in the organisation.

Hence Proved.

Whenever there is any crisis in any constituent of the system. It will lead to a crisis on whole. It can be seen that crisis always causes a loss, which can be evaluated as given in next section.

G. LOSS ESTIMATION DUE TO CRISIS [92, 99]:

It is a lifetime of crisis, which affects the loss of the system. A short duration crisis leads to affordable loss while long duration crisis makes the system. A short duration crisis leads to affordable loss while long duration crisis makes the system sick & many time losses becomes so heavy who leaves no alternatives accept to close the organization [91, 92.] The leading example in India, Uttar Pradesh particularly is **'UPTRON LTD.'** which has been closed recently.

Following describes losses of organization as given below-

1. We here by consider that the organization was in crisis for number of days equal to 'm' days.
2. The production losses for 'm' days if the rate per unit is 'x' and quantity produced is

   Y = x.y.z
3. m' days employs are paid the salary loss. If per day payment of employs comes out to the 'z'.

   Salary loss = m.z
4. The electricity and water payment. If it is 'w', then the loss will be = **w.m**

5. If rent / space loss. The entire organization unnecessary occupied the space Without doing any work. This will amount rent loss 'v' Rs / day = **v.m**
6. Security loss, the organization has to pay per day extra for security say equal to Rs 's' / day = **s.m**
7. Unforeseen losses are **= k.**

The total loss due to crisis will be the summation of all these and will be expressed as.

Total Loss = **[m (x. y + z + w + v + s)] + k**

Where, m = number of days.

& k = unforeseen losses.

H. CONCLUSION & SUGGESTION

The sudden occurrence of crisis termed impulsive crisis has been studied. A mathematical model in terms time and money are developed for the estimation of damage loss of the organization for instantaneously start of recovery and the recovery starting late. The results of case studies are tabulated in the study. The study will proved guidelines for the quantities estimation of any crisis in any organization.

I - COMPUTER BASED PROGRAMME ON ABOVE EQUATIONS

/* program name: LOSS ESTIMATION PAPER CRISIS */

```
/* ================================================== */
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
float m,xy,z,w,v,s,k,total_loss;
clrscr();
printf("enter the values of m,xy,z,w,v,s,k=");
scanf("%f%f%f%f%f%f%f",&m,&xy,&z,&w,&v,&s,&k);
total_loss=m*(xy+z+w+v+s)+k;
printf("\n TOTAL LOSS= %f\n",total_loss);
printf("\n where m=number of days\n");
printf("        k=unforeseen loss\n");
printf("       xy=production loss\n");
printf("        z=salary loss\n");
printf("        w=electricity &water paymentloss\n");
printf("        v=rent loss\n");
printf("        s=security loss\n");
getch();
}
```

Part VI

CONCLUSION

CHAPTER 6

CONCLUSIONS

Usually It is seen that every people is encouraged doing any work in which he/she may have some motivation. Person should be motivated by inner as well as outer side through some motivating factor. Motivating factor may be from inner side like their Gunas (Sattava Guna, Rajas Guna or Tamas Guna) or from outer side like fulfilling of Needs of individual or encouraging by improving the process or through reinforcement. Motivation also affects on the working ability of that individual. Before this work we were not able to estimate the role of these factors in the motivation of any individual. But after this work we are able to estimate the role of human gunas in any working scenario in any organization. Now we are also able to understand that Samkhya theory explain that Prakriti is the source of the world of becoming. It is pure potentiality that evolves itself successively into twenty four tattvas or principles.

The evolution itself is possible because Prakriti is always in a state of tension among its constituent strands The most subtle potentiality that is behind whatever is created in the physical universe, also called "primordial Matter".

It is also a state of equilibrium amongst the Three Gunas. We are also able to estimate not only the different role of the specific gunas but also the combination of different gunas with in working scenario. Sattava guna indicate the template of balance or equilibrium; Rajas guna shows a template of expansion or activity while Tamas guna a template of inertia or resistance to action. When Sattva is predominant, it overpowers Rajas and Tamas. When Rajas is dominant, it overpowers Sattva and Tamas. When Tamas is predominant, it overpowers Rajas and Sattva. When we estimate the inner power of motivation in numerical value we can use this value in the betterment of our organization. When we discuss about the outer motivation the different aspects of motivation need to be discussed that is, Need based motivation, Process based motivation and Reinforcement Based motivation.

After discussing different aspects of motivation now we are able to understand how we are affected through different type of motivation. The values of these motivations can be generated

through the Questioners created by the management. The formula below is enough to estimate the motivation value in any individual.

One more factor is also needed to be considered in estimating the motivation is working ability of that individual. We all know the fact that no one is perfect and according to the theory of probability perfection means 100%. So according to that nobody will be 100 percent and this means the value of working ability should be less than 1. After adding this value of working ability we are able to estimate the motivation through given equation:

Estimation Motivation = Mot * Wa

After the estimation of motivation it is necessary to calculate the total motivation value of an individual. In the process of research work we feel that the estimation of motivation is not giving the full value of motivation. There should be some factor which is missing in the calculation. After reading number of research papers and theories one more factor has been identified which was missing to complete the calculation of total motivation. The motivation is estimated on the basis of need of worker, process functioning, reinforcement, ability to work. It has been Realized that along with the above sets of methodology a third set is very important to be considered i.e., the in sighting of Nish-Kam-Karm effect (Bhagwat Gita) in worker or self realization for doing the job even without getting the result.

Nish-Kam-Karma realization is a typical theory. If one has to do some work then it comes in mind to think the gain by the act of work. The thinking of gain or profit is human weakness. In ancient Indian philosophy, nish-kam-karma philosophy has been emphasized that the product of doing work is excellent. If the men involved are not sighting only the gain but they work with the feeling of duty to God. Such type of feeling instill a very high value of motivation. These feelings are generated in one who even scarifies him. For calculating this theory we use the term Big O from THEORY OF GROWTH. When Nish-Kam-Karma philosophy is considered in the evaluation of motivation then the final motivation will be the convolution of Motivation and growth evaluation in terms of Nish-Kam-Karma. So the final formula to calculate the Total Motivation is:

Total Motivation =Mot * Wa* O (.)

After the evaluation of inner and outer motivation it is important to calculate the role of a leader who motivates the individual or group for contributing in the growth of his/her organization. In the first Para of the chapter we have discussed that Winston Churchill asserted that if he could have only one quality, it would be courage, because with courage we could acquire all other qualities. The motivating team leader uses encouragement to stimulate team members

to have the courage to believe in them. A leader is someone who has commanding authority and influence.

A broad definition of a leader as any person who influences individuals and groups within an organization, helps them in the establishment of goals, and guides them towards achievement of these goals thereby allowing them to be effective.

Different theories of leadership are discussed and one special research papers help is also taken that is, NK model / Kauffman model. NK model was developed by Kauffman, who have proposed a mathematical model to develop for the leadership in an organization. In the model they have discussed that there are M teams each headed by an in-charge of the team. It is further assumed that there are P workers in each team. It is assumed that the input raw material is of quality and is fully utilized. For such models Kaufman carried out a study in 1987.

In the mathematical analysis of the leadership the Leader's role and work, working ability of leader, Comparison of leader's ability, and circumstantial impact on leader have been discusses different issues have been formulated and through the data I can be able to evaluate /calculate the ability and role of the leader who can motivate the individual or a group. Through the formula we are able to compare the different leaders with in or out side of the leaders who are more effective in the motivation or leadership work. We are also able to calculate the circumstantial impact on leader in any situations. These formulas are very useful in calculating different aspects of leadership in any organization.

In the last chapter we have discussed about the Crisis management. Crises can be described as the possible but unexpected result of management failures that are concerned with the future course of events set in motion by human action or inaction precipitating the event. For the purpose of this “Study” we shall only be discussing those crises which are felt / experienced by an organization / production unit. We have discussed the different nature and components of the crisis. We have recommended actions in four or five main stages: pre-crisis, acute crisis, chronic crisis, and resolution. In this way we conclude the term crisis or impulsive crisis. The word 'Impulsive' means proceeding from natural feeling or impulse without external stimulus and if we talk in terms of organization then the discussion of crisis is done and its recovery is required to be made, then the important parameter is to identify the damage shape of the crisis. That is called 'Impulsive crises'. This study is limited to impulsive crisis only. Accordingly we have formulated the exclusive formula to calculate the impulsive crisis. Along with we have also formulated the formula for Estimation of the Damage due to Crisis.

There are two possibilities to estimate the damage when crisis recovery is exponential and the recovery process is envisaged in equation. The first case when recovery starts just after the happening of impulsive crisis, the other case will be when there is some constant delay in starting of recovery. Finally I have formulated the grand formula for calculating the damage after L time is:

$$D_L = [P_n(t)-P_c(t)]*L+\{P_n(t)[T-L]-(P_n(t)-P_c(t)\}*\int_L^T[1-e^{-t/k}]-(T-L)*P_c(t)\}$$

And finally we have formulated the departmental crisis formula i.e.

$$\text{Crisis 'C'} = H_c + M_c + P_c + I_c + H_c.M_c + H_c.P_c + Hc.Ic + M_c.P_c + M_c.I_c + P_c.I_c + H_c.P_c.Ic + H_c.M_c.I_c + M_c.P_c.Ic + M_c.H_c.P_c.I_c.$$

In which the main constituents/ Departments of any organization are: - Human Resource department, Marketing department, Production department, Information Technology department.

Part VII

SUGGESTIONS

CHAPTER 7

SUGGESTIONS

- Any employee linked with any programme in organization should essentially be satisfied to his/her needs for sustenance and growth. These needs are firstly organization related and secondly employees related. Unless a programme satisfy the needs of both the categories, it will not be much effective therefore; strategies should be made to motivate the employees on the basis of their prevalent inner Gunas, ie, Sattva Guna, Rajas Guna and Tamas Guna.
- Management should be educated & trained up to the level to which they would be able to quantify 1- the level of motivation, 2- different aspects of leadership (which is the most valuable source of inspiration for the human resources) and 3- last but not the least, estimation of the crisis and system to resolve the crisis. The management should also be apprised about the techniques, which will increase the motivation level among employees, optimize the output of the organization and also fulfill any other need of the organization. Therefore, management should try to adopt these mathematical equations for the betterment of their organizational culture.
- The management should formulate new strategies to promote Human Resource and its effective utilization which is one of the important functions by switching over from present prevalent organizational culture, to nish-kam-karm yog theory of motivation.
- During the study it has been found that management is not aware about the level of motivation of any individual. And if management somehow becomes aware that employees are either not motivated, or which type of motivation is required for that particular individual or group, then with the help of the equations derived in this thesis for that purposes, management can be able to calculate the motivation level of any employee. With the help of that result, management will be able to identify which type of motivational dose is required for them. Results indicate that employees either want to fulfill their needs or they want to restructure the process system and if the management is made able through the formulas developed in the thesis to understand and identify it then it may be able to apply the required reinforcement. It would be quite appropriate to keep the formulas in practices in order to

motivate the employees as per their requirement.

- In this way one may understand that if the fulfillment of the needs is required then some financial or non financial incentives should be provided for motivating the individual, or if process redesign is required then the working process should be restructured and if reinforcement is required then some instructions which may rejuvenate the strength of that particular worker or group be provided. This should be achieved by applying motivational formulas derived in this research work. Management is also suggested to develop strategies for calculation of total motivation effect upon any individual at any stage with the help of these three factors 1. MOT (a. Need based, b. Process based, c. Reinforcement based), 2. Working ability of any individual, 3. Nish Kam Karm (Big O or O (.)) of any individual on the basis of programmes and the equations developed in the computer language. The Raw data may be collected through questionnaires and can be processed through computer programming.
- In the study it has been observed that Leadership is the most valuable factor within the organization. If the leader is able to motivate the employees there results will be comparatively better. Several times we have seen that the particular project of the organization failed because the leadership of the management was ineffective. If many leaders are available within organization, it is the responsibility of the management to identify through the comparative study, which leader is suitable for any specific group. After assigning the particular work or project to the leader, management should watch continuously and measure their achievement and failure at each and every point of time the management should formulate the design and strategies for the leadership of the organization viz. leadership's ability, comparative formula for different leaders and circumstantial impact of leader on any individual or group. Computer programming has also been developed for the convenient of the managers. Raw data may be collected through prepared questionnaires.
- We have seen that many time crises occur within organization due to some specific factor. Management should also estimate the crisis which occurs within the organization due to the loss of a major factor or factors. The study gives the different mathematical formulas which will help to quantify as well as manage the crisis within the organization. Management is suggested to opt the formula for the calculation of crisis in any organization through which management may be able to calculate the damage what so ever caused to any organization and also may derive the formula to calculate the amount of recovery from the occurrence of crisis & damage caused to organization. Management is also suggested to take decisions on the basis of the formula derived in the thesis for crisis analysis in departments of an

organization. By adopting equations & computer programmes developed in the thesis management of any organization may be able to calculate the value of departmental crisis.

- These mathematical equations which have been derived from the above study are little bit complex in nature to understand but with the help of the given computer programming, equations have been made easier for the calculation. The persons who are not related with the management can also be able to use these equations through computer programmes. This will give accurate result without taking any time.

HOW THESE ABOVE EQUATIONS DERIVED IN THE DIFFERENT CHAPTERS CAN BE USED FOR THE BETTERMENT OF THEIR EMPLOYEES AND THEIR PRODUCTION SYSTEM- A HYPOTHETICAL MODLE FOR MANAGEMENT:

- A hypothetical model is given here for the convenience of the management of any organization. The above derived equations are very unique in nature. With the help of above equations management can quantify the motivation level of their employees. Some given points can help the management for getting raw data for the quantification of equations.

    1. Management has to prepare a questionnaire for collecting the raw data. Questionnaire should have five parts and having at least 50 to 100 questions. In first part of the questionnaire management should arrange the questions related to inner gunas. In this section / part management should select the question related to their habits, likes and dislikes and all. This part should be developed by psycho expert.
    2. In second part management should prepare the questions according to their need hierarchy and demands. In this part management should select the questions related to their needs, requirement of their life, number of Children, number of family members, number of dependents, satisfaction of salary structures, etc. this part of the questionnaire should be developed by human resource specialist and the representative of employees.
    3. In the third part of the questionnaire should contain the questions related to the working process of the organization. In this parts management should select the questions related to the working process and atmosphere of the organization. Management should select the questions regarding the working environment, newer technology, and safety measure of the organization, facilities provided by the managements, quality measures of the organization, six-sigma, other production systems and all. This part of the questionnaire should be prepared by

the head of different sectors, psycho experts, human resource experts and educationist.

4. This 4th part of the questionnaire should be based on nish kaam karm. In this section management should select the questions regarding their likes and dislikes and philosophies of their life of the employees. Employees are willing to do that work or not, employees are satisfied with their ranks or not etc. This section should be prepared by the psycho expert.

5. 5th part of the questionnaire should be based on their wrong activities. This part contains about the wrong activities which were attempted by the employees within the organization in last five years. This part indicates the reinforcement system of the organization. This part should be prepared by the psycho experts and HR experts. Examples of the questions- have you done any unethical work at the time of working like- taking alcohol, smoking, sleeping etc?

Management should assign the numbers for each and every question. After collecting the questionnaire; management will be able to collect the raw data for the calculation. Through this number management can quantify the each and every individual's present motivation level and also identifies that which type of motivation dose is required.

After calculation, management will be able to quantify the motivation level. We can also divide the motivation level in five parts hypothetically- these are- 1- Exceptional Category,2 – category one, 3- category two, 4- category three and 5- category four. We can also assign the percentage for each category.

1- Exceptional Category – up to 0%

2- Category one - more than 0 to 25%

3- Category two - 26 to 50%

4- Category three - 51 to 75%

5- Category four - 76 to Less than 100%

A framework/ mathematical model for the mathematical analysis for motivation in organization or sector are proposed. Since the idea is to “think globally and act locally”, the proposed framework/ mathematical model work from the initial level of the organization (lower level worker) to higher side of the organization (Top management people).

The below give table* indicate that which type of motivational treatment is required for the specific employees which comes under given above categories.

Percentage of Motivation level	Inner Gunas Motivation	Need based Motivation	Process Based Motivation	Nish- Kam-Karm Based Motivation	Reinforcement Based Motivation
Exceptional Category **Up to 0%**	Good amount of motivational effort is required (eg. Management counseling, psycho-expert counseling, Yoga, meditation is/ are required)	Good amount of motivational effort is required eg. Financial benefits like- increments, bonus, financial reward etc are required and non financial motivation like- appreciations, non financial rewards, other important responsibilities, Promotions, Recognition of the work, interesting work, job security etc are required)	Good amount of motivation effort is required eg. Improvement of the working process, introduction of newer technology like JIT, Kaizen system etc, system should be based on six sigma, quality circle, etc should be applied)	Good amount of motivational effort is required (eg. Yoge, dhayan, prathna, Management counseling, psycho-expert counseling, meditation is/ are required)	High level of motivational efforts are required (Punishment like Threats, Demotion, penalty, suspension, etc is /are required.)
Category-1	High level of effort is required (Management	Good amount of effort is required	Good amount of motivation effort	Good amount of motivational	Less amount of

Percentage of Motivation level	Inner Gunas Motivation	Need based Motivation	Process Based Motivation	Nish- Kam-Karm Based Motivation	Reinforcement Based Motivation
more than 0 to 25%	counseling, psycho-expert counseling, Yoga, medication is/ are required)	(Financial like-increments, bonus, financial reward etc are required and non financial motivation like-appreciations, non financial rewards, other important responsibilities, Promotions, Recognition of the work, interesting work, job security etc are required)	is required eg. Improvement of the working process, introduction of newer technology like JIT, Kaizen system etc, system should be based on six sigma, quality circle, etc should be applied)	effort is required (eg. Yoge, dhayan, prathna, Management counseling, psycho-expert counseling, meditation is/ are required)	Effort is required. (Punishment like Threats, Demotion, penalty, sentence, suspension, etc is /are required.)
Category-2 26 to 50%	Good amount of effort is required (Management counseling, psycho-expert counseling, Yoga, medication is/ are required)	Good amount of effort is required (Financial like-increments, bonus, financial reward etc are required and non financial	Less amount of motivation effort is required eg. Improvement of the working process, introduction of	Good amount of motivational effort is required (eg. Yoge, dhayan, prathna, Management	Very Less amount of effort is required (Punishment like Threats, Demotion, penalty, sentence, suspension, etc is

Percentage of Motivation level	Inner Gunas Motivation	Need based Motivation	Process Based Motivation	Nish- Kam-Karm Based Motivation	Reinforcement Based Motivation
		motivation like-appreciations, non financial rewards, other important responsibilities, Promotions, Recognition of the work, interesting work, job security etc are required)	newer technology like JIT, Kaizen system etc, system should be based on six sigma, quality circle, etc should be applied)	counseling, psycho-expert counseling, meditation is/ are required)	/are required.)
Category-3 **51 to 75%**	Good amount of effort is required (Management counseling, psycho-expert counseling, Yoga, medication is/ are required)	Less amount of effort is required (Financial like-increments, bonus, financial reward etc are required and non financial motivation like-appreciations, non financial rewards, other important responsibilities,	Less amount of motivation effort is required eg. Improvement of the working process, introduction of newer technology like JIT, Kaizen system etc, system should be based on six	Good amount of motivational effort is required (eg. Yoge, dhayan, prathna, Management counseling, psycho-expert counseling, meditation is/ are required)	Very Less amount of effort is required (Punishment like Threats, Demotion, penalty, sentence, suspension, etc is /are required.)

Percentage of Motivation level	Inner Gunas Motivation	Need based Motivation	Process Based Motivation	Nish- Kam-Karm Based Motivation	Reinforcement Based Motivation
		Promotions, Recognition of the work, interesting work, job security etc are required)	sigma, quality circle, etc should be applied)		
Category-4 **76 to less than 100%**	Less amount of effort is required (Management counseling, psycho-expert counseling, Yoga, medication is/ are required)	Less amount of effort is required (Financial like-increments, bonus, financial reward etc are required and non financial motivation like-appreciations, non financial rewards, other important responsibilities, Promotions, Recognition of the work, interesting work, job security	Less amount of motivation effort is required eg. Improvement of the working process, introduction of newer technology like JIT, Kaizen system etc, system should be based on six sigma, quality circle, etc should be applied)	Good amount of motivational effort is required (eg. Yoge, dhayan, prathna, Management counseling, psycho-expert counseling, meditation is/ are required)	Very Less amount of effort is required (Punishment like Threats, Demotion, penalty, sentence, suspension, etc is /are required.)

Percentage of Motivation level	Inner Gunas Motivation	Need based Motivation	Process Based Motivation	Nish- Kam- Karm Based Motivation	Reinforcement Based Motivation
		etc are required)			

*This table is derived with the help of Maslow's need hierarchy theory, book "Management taxes and cases" by 'VSP Rao & V Hari Krishna' chapter 22 "motivation morale and productivity" ISBN 81-7446-317-8 (PB) first edition 2002.

Exceptional category up to 0%:

In this category people are extreme de-motivated and frustrated; the quantitative value of their motivation level is zero or less than zero. These category person needs lot of motivational inputs. As we have divided motivation types in five parts, and these types of people need lot of reinforcement motivational inputs as well as they need good amount of other motivational inputs too. But the main emphasis will be on reinforcement motivational input. Reinforcement motivation can be characterized as punishments like Threats, Demotion, penalty, suspension, etc

Category-1 (more than 0 to 25%):

In this category people are de-motivated due to inner Gunas requirements. The quantitative value of their motivation level is between 0 to 25%. We have divided motivational inputs in five parts, and these type of people wants lot of motivational input to reframe their inner gunas as well as they want good amount of other motivational inputs too. But the main emphasis will be on reframing of inner gunas motivational input. Inner gunas motivational input can be characterized as Management counseling, psycho-expert counseling, Yoga, medication etc.

Category 2 (26 to 50%):

In this category people are little de-motivated due to physiological as well as other need based requirements. The quantitative value of their motivation level is between 26 to 50%. We have divided motivation level in five parts, and these types of people wants lot of physical and materialistic things for the fulfillment of their needs. They also need some good amount of other motivational inputs. But the main emphasis will be on need based motivational inputs. Need based motivational inputs can be characterized as Financial benefits like- increments, bonus, financial reward etc are required and Non financial motivation like- appreciations, Power, non financial rewards, other important responsibilities, Promotions, Recognition of the work, interesting work, job security etc. for this category people reinforcement motivational inputs will required very less.

Category-3 (51 to75%):

In this category people are motivated but not fully motivated due to some difficulties in organizational process /environment / atmosphere. The quantitative value of their motivation level is between 51 to 75%. We have divided motivation level in five parts, and these types of people wants lot of changes in organizational process or environment. They also need some good amount of other motivational inputs. But the main emphasis will be on the restructuring of the organizational process system or organizational culture. Process based motivation can be characterized as Improvement of the working process; introduction of newer technology like JIT, Kaizen system etc, system should be based on six sigma, quality circle, etc.

Category-4 (76 to less than 100%):

In this category people are very motivated but not up to their desired level due to the lack of

Nish-kam-karm and process based motivation level. The quantitative value of their motivation level is between 76 to 100%. We have divided motivation level in five parts, and these types of people wants lot of nish-kam-karm feeling as well as wants good amount of changes in process of the organization. They also need some good amount of other motivational inputs. But the main emphasis will be on nish kam karm motivational inputs. Nish–kam-karm motivational inputs can be characterized as Yoge, dhayan, prathna, Management counseling, psycho-expert counseling, meditation etc. For this category people reinforcement motivational inputs will required very less.

Through this effort management are able to increase the motivation level of any individual. Through this effort a management will be able to identify the persons who are fully motivated and need not any further amount of motivation and are able to become leader.

- In the second step of the research a formula has derived to calculate the role of leader in the organization and also calculate the comparative formula as well as the impact of the leader upon the organization.

In this step management should identifies the different leader within the organization. With their past achievement management can get their past records. On the basis of our comparative formula and its result, management will be able to identify the best leader among the given number of leaders (see the example in given table** values can get with the help of given formulas in chapter III.)

Leadership	**Achievements (Function of given factors)**	Leader 1	Leader 2	Leader 3
Appropriate style of the leader	Focus on the managers, Focus on the subordinates, focus on the situation	20	30	30
Forces on the manager	Ability, authority, confidence, value system	40	50	55
Forces on the subordinate	Maturity, job security and psychological efforts, authorization, locus on control, skill	55	45	40
Forces on the situation	Culture, cohesiveness, relation, structure	70	65	55
	Total	**185**	**190**	**180**

**this table is developed with the help of the chapter “managing the leaders” by 'Amar kumar

mishra' of the book “mastering change for organizational excellence” edited by “S.S. Bhakar”. ISBN 978-81-7446-581-8, first edition 2007.

With the help of above table management can identify that the leader-2 is more effective in comparison with others. For getting the raw data for calculation management has to develop a questionnaire on the basis of achievements (function of given factors) and thereafter with the help of comparative formula management will be able to get the different values for the given leaders.

After the selection of the suitable leader and assigning the particular work or project to the leader, management should watch continuously and measure their achievement and failure at each and every point of time with the help of impact formula which is derived in chapter III. Through the impact formula of the leader management can get the productivity value of the leader. And this value will help to judge the performance of that particular leader. On the basis of final results management should formulate the design & strategies for the leadership of the organization according to their results.

- The main objective of the study is to understand the crisis situations affecting the production sector as well as to come up with some plan of action to overcome these crisis situations.

It needs to be emphasized here that it is next to impossible to avoid such events, which would lead to crisis situations as the events are not under our control. The idea here is to minimize the impact of these in every corner of the country/world. To counter and handle these situations we have to formulate a crisis management plain. Suggestion towards the making a crisis management framework is mentioned below.

Identification of the possible crisis situations in the country/ world is very important. Mathematical analysis is very fruitful during this stage. The mathematical analysis should be questionnaire based as well as based on the efficiency of the management competency. The Crisis and disaster lifecycle is discussed in chapter IV.

Once we have identified the possible crisis situation, it becomes our duty to create awareness about the crisis situation particularly in production organizations.

As we have derived some formulas for estimation of the crisis which will help the management to estimate the crisis as well as to use the recovery process also. Estimation of loss is also possible for the management.

A framework for the crisis management in production sector or any organization is proposed. Since the idea is to “think globally and locally”, the proposed framework/ mathematical model works from the initial level of the organization to higher side of the organization.

Given table will help the management to form some unique strategies to overcome the crisis.
***

Different aspects	Formulas	Values	What management can do through this formula?	Management strategies
Value of the organization	**The value of the organization= $P_n(t)$ if $t< \tau$** **= $P_c(t)$ if $\tau <t<T$** **= $P_r(t)$ if $t>T$**	(-)	Value of the organization can be calculated with the help of given formula.	This formula will help the management to identify the value of his organization
Recovery curves from crisis	**$P_c(t) = [\{P_n(\tau)- P_C(m)\}*(1-e^{-t/k})]$**	(-)	This formula helps to draw the curve of the recovery from the crisis.	This curve will give the different stages of the crisis of any organization
Crisis management time	**Crisis Management Time α (1/k)**	(-)	This equation helps to find out the time which is used in the management of the crisis.	This time management will help the management of the organization to improve their efficiency to manage the crisis which occurs in near future.
Estimation of damage due to crisis: a) when recovery starts immediately	(Damage)**$Di = P_n(t)* T -[P_n(t)- P_c(t)]* \int_0^T [1-e^{-t/k}]dt$**	(-)	These two formulas (a and b) helps to find out the value of recoveries at two different stages a) when recovery starts immediately after crisis. b) when recovery starts	Through this equations management will be able to formulate the strategies for their recovery process.

Different aspects	Formulas	Values	What management can do through this formula?	Management strategies
after crisis. b) when recovery starts after delay	$D_L = [P_n(t)-P_c(t)]*L+\{P_n(t)[T-L]-(P_n(t)-P_c(t)\}*_L \int^T[1-e^{-t/k}]-(T-L)*P_c(t)\}$		after delay	
Total departmental crisis	**Crisis 'C' = $H_c + M_c + P_c + I_c + H_c.M_c + H_c.P_c + H_c.I_c + M_c.P_c + M_c.I_c + Pc.Ic + H_c.P_c.I_c + H_c.M_c.I_c + M_c.P_c.I_c + M_c.H_c.P_c.I_c$.**	(-)	This formula gives the value of total crisis when one or more than one department facing crisis.	Through this equation management can identify which department is facing the crisis and what will happen in near future due to this crisis.
Loss estimation due to crisis	**[m (x. y + z + w + v + s)] + k**	(-)	This formula is helpful for the estimation of the loss due to crisis.	This loss estimation will be helpful to form an excellent strategy for the recovery of that loss.

table derived with the help of the research paper, Sachin K Srivastava et.al, **"Evaluation of crises and its management Vis-à-vis a mathematical approach."; "Skyline Business Journal (SBJ)** ***ISSN-1998- 3425 *Volume - V Number 2 Spring 2009 page no. 7-12* ***(Published) (International)***

Above given formulas are very unique and important in the management of the crisis. With the help of all formulas management can be able to make strategies for their survival at the time of crisis.

1. **Value of the organization formula:** This formula makes management able to understand the value of their organization at any point of time.
2. **Recovery curves from crisis:** This formula helps to draw the curve of the recovery from the crisis. This curve will give the different stages of the crisis of any organization. This is a unique type of curves which gives the clear picture of the recovery chart of any organization.
3. **Crisis management time:** This equation helps to find out the time which is used in the management of the crisis. This time management will help the management of the organization to improve their efficiency to manage the crisis which occurs in near future.
4. **Estimation of damage due to crisis:**

   a) when recovery starts immediately after crisis.

   b) When recovery starts after delay:

   These two formulas (a and b) helps to find out the value of recoveries at two different stages a) when recovery starts immediately after crisis. b) When recovery starts after delay. Through these equations management will be able to formulate the strategies for their recovery process. These equations give management two different situations in which management can make some strategies so that they can overcome from this situation.
5. **Total departmental crisis:** This formula gives the value of total crisis when one or more than one department facing crisis. Through this equation management can identify which department is facing the crisis and what will happen in near future due to this crisis.
6. **Loss estimation due to crisis:** This formula is helpful for the estimation of the loss due to crisis. This loss estimation will be helpful to form an excellent strategy for the recovery of that loss.

The Raw data will be calculated with the help of questionnaire. And the questionnaire should be prepared by the top management of the organization or the crisis management experts.

Part VIII

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CHAPTER 8

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