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Nadeem Malik

Shafeequr Rehman

Davood Salmani

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# Academic Leadership Journal

## [Mathematical conformation of leadership based on Erosmatic](#)

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Author(s): [Nadeem Malik](#), [Shafeequr Rehman](#), and [Davood Salmani](#)

## **Mathematical conformation of leadership based on Erosmatic**

By <sup>1</sup>Nadeem Malik Supervisor Dr <sup>2</sup>Shafeequr Rehman Dr Davood Salmani

### **Summary**

In this study after comparing charismatic leadership with Erosmatic leadership or leadership based on love and affection, we will name the leadership based on love and affection "EROSMATIC" the optimum leadership and through systematic perspectives, we will mathematically and statistically review it. After this review, three formulas are offered. The first formula with applying practicable contingent, statistics and properties of the Markov chain, will investigate and predict the contingent amount of the leaders success in effecting subordinates and the amount of expressed love and affection "EROSMATIC" of the subordinates towards the leaders (Contingently). The second formula by applying simple Differential equations will calculate the amount of the leaders influence on subordinates considering the pass of time.

At the end of this study, the interaction point between leader and subordinates will be reviewed and after mathematical analyzing the reached conclusion will be described.

### **Key terms**

**LEADERSHIP:** The process of influence and effect on others so to achieve a specific goal

**EROS:** The process of penetrating in others feelings and affections

**INTERACTIONS:** Bilateral developed data exchange

**EEFFECTIVE LEADERSHIP:** The leader's utility or effectuality for enhancing the success of those working with him. In other words, a leadership is called successful, that can achieve amid goals Therefore however much more success is increased, and leadership is called more effective.

Because utility = efficiency + effectiveness (correct doing + doing the correct) , by increasing effectuality, consequently utility will also increase.

According to the above formula, we can present another definition of effective leadership and that is a leadership, which defines correct actions from incorrect actions and will act upon them.

### **Method of study**

Studying about application of statistics and contingent in leadership and reviewing leadership by mathematical formulas is a fundamental study. In this study, it has been tried to relate statistics and contingent by applying the properties of the Markov chain to leadership based on love and affection "EROSMATIC", and by solving methods of formulized differential equations calculating the amount of the leaders influence on subordinates.

### **Introduction**

A leader is an individual who is further than his own time and others obedience of him is without force and completely voluntarily. A manager, as a successful and effective leader must penetrate in to his subordinate's hearts by applying different mechanisms.

The daily increase of speed and complexity of the modern world, not only has gathered the attention of researchers and organizational managers to it self, but also has caused their further effort so to find factors which will increase the organization's leadership. Therefore, it is necessary for them to use instruments, which will increase their ability in co-coordinating and conforming with today's evolutions in the direction of achieving their organizations goals.

For developing a powerful leadership, which is a necessity of the organizations continuance, it is better to confront it systematically so to gain time to review, control and evaluate the performance method for the leader. Some times a mathematical model however simple and partially without care can clarify a subject easily.

Statistics and contingent are considered crucial instruments for developing the quality of leadership. This is because the method of statistics can be applied so to define and identify variability in environment and work. Although variability, is resulted from change in conditions which observation is done in them but mathematical discussions and statistics can be considered as a base for leaders and managers performance.

Sometimes in all natural and human built systems, it is required to consider accidental behaviors, because the most evident factor of a real variable is its figural amount. The given figures, which are applied in statistic analysis and mathematical calculations, are normally two types.



1-Formulas , which are gained through counting.

2-Measurements, which shows the minimum or maximum of a feature or object according to a measurement scale. These numbers are gained through examination of a phenomenon. Although leadership is a quality adjective and quality adjectives do not have unit and cannot be measured or compared but some features of leadership can be taken to statistic and by applying parameters, we can reach contingent results.

Therefore, accidental factor are only considered and introduced when effective variable of a specified adjectives are so much or so unreachable that we are forced to consider behavior as dependent from contingent's so to present a stronger mathematical proof.

Leadership based on love and affection "EROSMATIC" when compared with charismatic leadership is noticeably more successful and effective. This is because in charismatic leadership, the leader by using personal charismatic modes, charismatic and personal and specifics influences individuals and to make individuals obey his ideas and orders. Therefore, in charismatic leadership, the fundamental aspect is special characteristics and psychological modes of the leader but in leadership with love and affection "EROSMATIC", the foundation is on the leaders' performance, arising of affection and love "EROSMATIC" towards his subordinates.

#### **The process leadership based on love and affection**

The process of leadership based on EROSMATICS includes four essential concepts.

These four concepts are:

- 1- **CARRING** because of feeling connected and the desire to be connected in individuals, caring is created and the individual cares for others and tries to participate in there activities.
- 2- **SHARRING** presenting a part of a thing to another or dividing what will provide sharing, is the definition of sharing, results in feeling proud, and in conclusion respect.
- 3- **RESPECT** showing respect to others or feeling proud is resulted from sharing and causes the individual to feel responsible.
- 4- **RESPONSIBILITY** is the condition which, the individual who has accepted a duty and who must be answerable towards that duty.

The first condition for the four terms mentioned above is "POSITIVE INFLUENCE".

Leadership's foundation is based and blended with love and affection "EROSMATIC", the leader's expression of love and affection to his subordinates must



be equal. Here we can define the leadership as an influential and effective process on others, for achieving a particular goal. And to consider Eros as influence on individuals and subordinates (societies) feelings and affections, In away that after the foundation of the leader's love and affection "EROSMATIC" toward his subordinates three essential level take place.

The three essential processes of leadership blended with Erosmetics, which have been originated from the series of leadership articles are as below:

1- The initiation of expressing affection and interest towards personnel and individuals (society) by the leader. It is the leader, who initiates the process of love, and affection and interest towards his personnel and individuals (society), it is the leader who wants to penetrate in his subordinate's hearts, and the best method to achieve this objective is Erosmetics.

2- Expression of love and affection "EROSMATIC" and interest changes direction from individual (society) towards the leader.

When personnel face the leader's love and affection "EROSMATIC", and these penetrate in his mind and heart, then the direction of love and affection "EROSMATIC" will change from individual (society) towards the leader, and this exchange of love and affection will become bilateral.

3- The perfected form of this exchange will as interaction.

In this level there exists a bilateral cycle between the leader and the subordinates and the way is prepared for the co-operation of the subordinates with the leader. by gathering personnel's job satisfaction, increase in work results and the organizations goals will be achieved.

### **Mathematical conformations**

For mathematical zing the pre-mentioned properties, we must consider the below theories:

1- Number of conditions is unlimited. (By conditions, we mean gap periods created between the leader and his subordinates).

2- Disconnected time is as  $(t=0, 1, 2\dots)$

3- The future is only dependent on the present and completely independent from all past periods (past conditions). This means the future created level is only dependent on the present level and independent from the past level.

4- Contingent of transition from one level to the next will not change with the pass of time. This means pass of time cannot be effective on transition.





Therefore we consider  $D$  a unlimited set of  $n$  ( $N$  «Natural digits» because they imply number transition)

$\{X_t: t= 0, 1, 2, \dots\}$  Shows a chain of random variants with an amount on  $D$ .

According to the Markov properties, we have:

$$\Pr\{X_{t+1}=I_{t+1}|X_0=i_0, \dots, X_t=i_t\}$$

According to assumption 3

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$$\Pr\{i_{t+1}|X_t=i_t\}$$

We will assume:

$$P_{ij}(t) = \Pr\{x_{t+1}=j|X_t=i\}$$

Shows the contingent of condition change and  $P(t)=[P_{ij}(t)]$

In this situation it is considered that  $P(t)=P$  is independent from  $t$ .

Under these conditions  $\{X_t\}$  a Markov chain- Parameter with the contingent of *MANA* condition change (3, 4, 5, 6).

We will start with a directed graph on three apexes (one apex the leader and the other two apexes are the subordinates). Consider  $P_{ij}$  shows the transition from apex  $i$  to apex  $j$ .

At first when no action has been taken by the leader or the subordinates, we will have  $P_{ij}=0$ , therefore transition from  $i$  to  $j$  is shown as the  $P=[P_{ij}]$  matrix.

$$P = \begin{matrix} 1 & \begin{bmatrix} 0 & 0.50 & 0.50 \end{bmatrix} \\ 2 & \begin{bmatrix} 0 & 0.25 & 0.75 \end{bmatrix} \\ 3 & \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \end{matrix}$$

This matrix, which is illustrated as an example, has interesting properties. Addition result of each line is one, therefore each line of matrix  $P$  is a vector of ratios or

limit

contingent and for that vector, and we will have  $\lim_{t \rightarrow \infty}$ . This equation states that the

more passes from the beginning of the mutual affection, the rate of that will reach its maximum amount in the contingent theory,  $\pi_t$  shows the amount of bilateral love in time  $t$ .

By  $\infty$  in the above passage we mean the amount of time required for the leader and his subordinates to truly, love each other, and by  $\infty$  we do not mean mathematics.

In the most primary levels, leadership is without any kind of effect on subordinates therefore we will have:

$$\pi_0 = (1, 0, 0)'$$

The illustrated numbers show the amount of Eros a leader has for himself and his subordinates:

This means the leader is at the beginning of the first level of leadership based on Erosmetics, or has not yet applied Erosmetics towards his subordinates.

In the next level, the leader will apply Erosmetics towards his subordinates and therefore we will have:



$$\pi_1 = (0, 0.5, 0.5)'$$

In the third level of Erosmatic, this will change and it will be from subordinate towards the leader, but rather less than the leader's, and we will have:

$$\pi_2 = (0.5, 0.125, 0.375)'$$

The next changes are more complex which we have presented its calculations below:

$$[P_{11} \ P_{21} \ P_{31}] \begin{bmatrix} \pi_2(1) \\ \pi_2(2) \\ \pi_2(3) \end{bmatrix} = \pi_3(1) = P_{11} \cdot \pi_2(1) + P_{21} \cdot \pi_2(2) + P_{31} \cdot \pi_2(3)$$

$$= 0 \cdot (0.5) + 0 \cdot (0.125) + 1 \cdot (0.375) = 0.375$$

$$[P_{12} \ P_{22} \ P_{32}] \begin{bmatrix} \pi_2(1) \\ \pi_2(2) \\ \pi_2(3) \end{bmatrix} = \pi_3(2) = P_{12} \cdot \pi_2(1) + P_{22} \cdot \pi_2(2) + P_{32} \cdot \pi_2(3)$$

$$= (0.5)(0.5) + (0.25)(0.125) + (0)(0.375) = 0.28175$$

$$[P_{13} \ P_{23} \ P_{33}] \begin{bmatrix} \pi_2(1) \\ \pi_2(2) \\ \pi_2(3) \end{bmatrix} = \pi_3(3) = P_{13} \cdot \pi_2(1) + P_{23} \cdot \pi_2(2) + P_{33} \cdot \pi_2(3)$$

$$= (0.5)(0.5) + (0.75)(0.125) + (0)(0.375) = 0.34375$$

The above calculations can be summarized as a  $\pi_3 = P' \cdot \pi_2$

Generally if  $\pi_t$  shows the division of  $X_t$ . Then we will have:

$$\pi_t(j) = \Pr\{X_t = j\} = \sum_i \Pr\{X_t = j | X_{t-1} = i\} \Pr\{X_{t-1} = i\} = \sum_i P_{ij} \cdot \pi_{(t-1)(i)}$$

This can be shown as the  $\pi_t = P' \cdot \pi_{t-1}$  matrix.

$\pi_t$  = shows the division of  $X_t$

$P'$  = is the transition matrix from one condition to another

$\pi_0$  = leaders condition

$\pi_{t-1}$  = condition predicted for subordinates

$\{X_t\}$  = a Markov chain

Therefore, division of each  $X_t$  will be completely calculated through  $X_0$  divisions. This is while the specific conditions of the subordinate's environment can be also included in equations as limit and required calculation can be carried out.

Two apply able theorem in this regard are:

1- The concentrated law of large figures

2- The theorem of the central limit

**The concentrated law of large figures**

*This theorem has been brought so to estimate the number of additional subordinates*

This theorem state that at the end, all subordinates will incline toward the leader

**Central limit theorem:**

*This theorem states that at the end, all subordinates will approach the leader, if the third level of Erosmatic is reached:*

If a disconnected Markov chain-parameter has a strictly positive variation contingent.

Then  $\delta^2 \in R$  will exist in a way that



$$\lim_{N \rightarrow \infty} E[\sqrt{N} \cdot (I_N - I)]^2 = \delta^2$$

In addition if  $\delta^2 > 0$ ,  $\sqrt{N} \cdot (I_N - I)$  by division will be convergent with a normal random variable with an average of zero and variance  $\delta^2$ . Therefore  $I_N$  is a confirmative estimate of  $I$ .

### Analyzing with differential equations:

If we consider the leader as  $A$  and subordinates as  $B$ ,  $x(t)$  and  $y(t)$  as the amount of  $A$  and  $B$ 's influence at time  $t$  on each other, it is inspected that with this influence a new condition is created.

This new situation at the third level of leadership based on love and affection, which is the level that exchange reaches completion, and is gradually formatted.

Therefore, we will have:

$dx/dt = dy/dt$  that is, the two lines will reach each other at the point where leaders influence on subordinates has reached interaction and balance this means they have equal slopes.

It is considered that  $x$  and  $y$  have formation at time  $z(t)$  or will reach completion. At the same time  $a$  and  $b$  will be regarded as the primary conditions of the leader and subordinates and will consider a number for it. Then we will have:

$$X(t) = a - z(t)$$

$$Y(t) = b - z(t)$$

$$dz/dt = -dx/dt = -dy/dt$$

the quality  $dz/dt$  is called the velocity of effectuality or influence.

$$dz/dt = kxy$$

$$dz/dt = k(a-z)(b-z)$$

$K$  will be considered as the invariable of the positive proportion. This should also be considered that  $z(0) = 0$

$\int dz/(a-z)(b-z) = k \int dt$  By applying fraction, the left integral is calculated.

$$1/(a-b) \int (-1/(a-z) + 1/(b-z)) dz = kt$$

$$(1/(a-b)) \ln(b(a-z)/a(b-z)) = kt$$

The amount of influence  $K$  can be calculated through measurement of  $t$  different times.

$$\text{Amount of influence: } z = ab(e^{k(a-b)t} + 1)/ae^{k(a-b)t} - b$$

$z$ : the amount of influence

$a$ : the leaders primary condition

$b$ : the subordinates primary condition

$k$ : invariable number

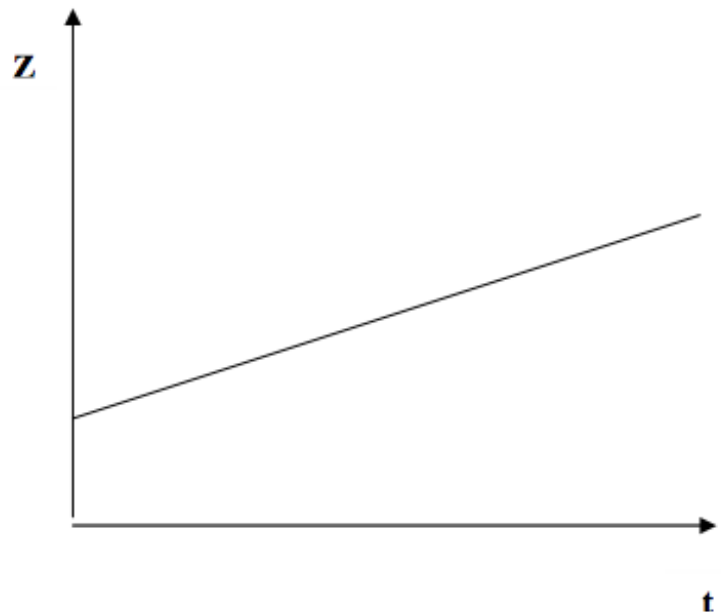
$e$ : (2/8)

**The interaction point:**



The interaction point is actually the third level of leadership. That is if we draw the tangent line on the influence or leader's effect on subordinates curve  $dz/dt$  and the tangent lines on each subordinates curve separately.

$$d_z/d_t = -d_y/d_t$$



At this point, we will only discuss about one of the subordinates and then discuss about them all:

The primary definition of leadership based on love and affection "EROSMATIC", which is also "caring", will be placed as the invariable primary figure, and we will call it  $c$ .

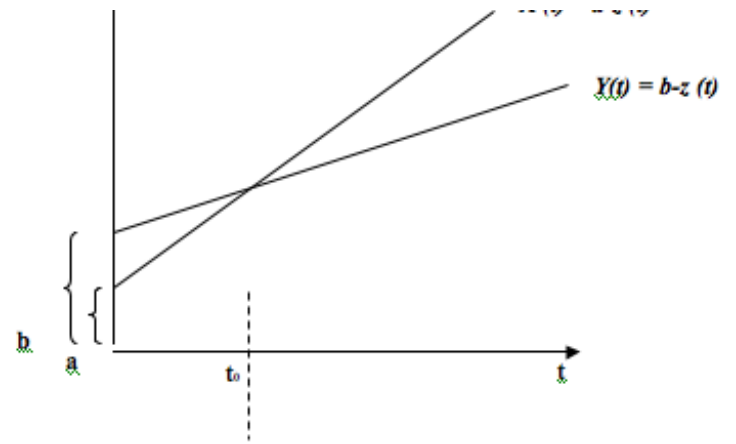
The amount of  $c$  for the leader is less than the amount in the subordinates; this is because the leader wants to reach the next level. Therefore, we can say: parameter  $c$  in *Leaders* < parameter  $c$  in *subordinates*

However, the slope of the tangent line of the leaders curve is more than the tangent slope of the subordinates curve; this is because the velocity of the leaders influence is actually the curves slope and must be more than the subordinates. Now if these two curves are drawn in a diagram they will be forced to cut each other and the tangent lines on the curve will cut each other at one point, which this point is actually the interaction point and in other words, we can say this point, is the "sharing" point.

It is in this point, which "I" as the leader and subordinate is eliminated and "WE" is created. Therefore, from then on this point will be the area of respect and responsibility.



$$X(t) = a-z(t)$$



**Conformation, proving, and description of geometrical leadership based on love and affection (EROSMATIC):**

Generally, the relationship diagram between the subordinates and leader is as below  
Figure 1-1

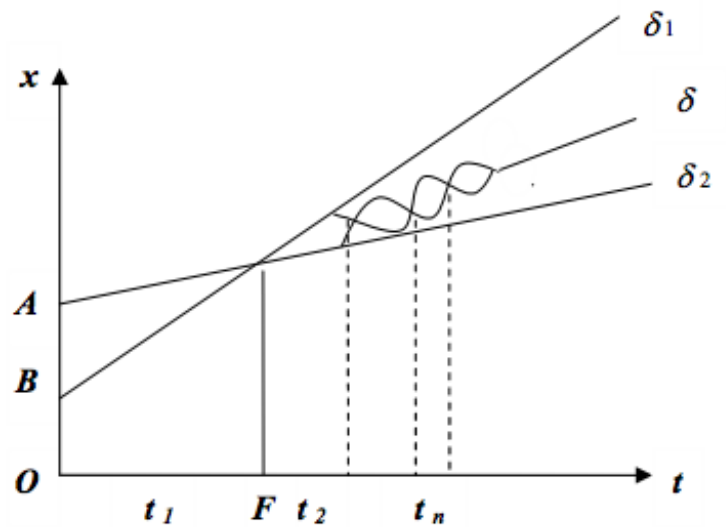


Figure 1-1 explanations:

AE1: First level  $p \rightarrow q$

BE1: Second level  $q \rightarrow p$

E1: Third level  $p \leftrightarrow q$

$\delta$  = means that after a while all needs and desires of the leader and subordinates become one,  $\delta_1$  and  $\delta_2$  conform with each other and make  $\delta$ .

At first, that is at time 0 ( $t=0$ ) the leader shows more love towards his subordinates therefore in this period, because ( $t_1$ ) is dependent and influence is assumed as a function from the mean point of the leaders influence is more, therefore  $b > d$ .

On the other hand, because the slope of these two lines is not equal thus they will be perform to cut each other (because  $c > a$ ,  $a \neq c$ ) therefore point E will cover the third level of leadership.

The velocity of leaders influence on  $x_1 = at + b \rightarrow \frac{dx_1}{dt} = a = V_1$  is dependent on

leaders influence on subordinates at period  $t_1$ .

Trapezoids area =  $OF \times \frac{OA + EF}{2}$

$OAEF$  = the amount of leaders influence on subordinates at period  $t_1$

$$OF \times \frac{OB + EF}{2} = \text{trapezoids area } OBEF = \text{the}$$

amount of influence on the leader at period  $t_1$ .

Before the point of interaction and balance  $E$  is ( $c > a$ ) but at this point  $a = c$ . therefore according to the equation  $f(\text{responsibility acceptance, partnership and paying attention}) = \text{leadership}$ , we will have:

1) paying attention = area  $ABE$

2) partnership = point  $E$

3) respecting

4) responsibility acceptance



In other words for the alternation period  $t_1$

$$\begin{cases} X_1 = at + b \\ X_2 = ct + d \end{cases}$$

$$X_1 = X_2 \Rightarrow at + b = ct + d \Rightarrow at - ct = d - b \Rightarrow$$

$$t = \frac{d - b}{a - c} \Rightarrow$$

$$\text{First level} \quad a > c \quad t < \frac{d - b}{a - c} \quad p \rightarrow q$$

$$\text{Third level} \quad a = c \quad t = \frac{d - b}{a - c} \quad p \leftrightarrow q$$

$$\text{Second level} \quad a < c \quad t > \frac{d - b}{a - c} \quad p \leftarrow q$$

From point  $E$  we must increase  $a$  (leader must respect subordinates) and  $c$  must be reduced (subordinates must feel more responsible) so to reach the balance mode. Although this change in the future period will become converse and one in between this change will accrue until the future balance and interaction point appears.

Explanation: the process of leadership based on love and affection "EROSMATIC" can also be easily proved through logical sentences:

$$p \rightarrow q \quad \left\{ \begin{array}{l} P \wedge \sim q \equiv p \rightarrow q \\ q \wedge \sim p \equiv q \rightarrow p \end{array} \right.$$

In the first level, the leader will love the subordinates.

In the second level the subordinate will love the leader

According to figure 1-1, the EROSMATIC diagram in the future periodicity period  $t_i$  ( $i \geq 2$ ), is not lined but exponential function and logarithm. Therefore, we can say:

From point  $E$  fort, the two lines  $\delta 1$  and  $\delta 2$  will become divergent. for reconverging these two lines factors 3 and 4 must be regarded so according to the diagram at the future periodicity level we can reach interaction and balance where ever this convergence faces defeat the relationship between the leader and his subordinates will be broken and the leader will fail





$$\begin{cases}
 X_1 = e^{t_2} \\
 X_2 = \ln t_2 \quad \underline{I} \\
 \Rightarrow e^{t_2} - \ln t_2 = 0
 \end{cases}
 \begin{array}{l}
 \text{The leaders influence on subordinates} \\
 \text{function at } t_2 \\
 \text{The subordinates influence on their} \\
 \text{leader function at } t_2
 \end{array}
 \quad X_1 = X_2$$

This equation radical has given the amount of  $t_2$  which by placing it in  $\underline{I}$ , we can gain the amount of  $X_1$  and  $X_2$ .

This argument can be used in future periodicity periods to find  $t_i$  correspondent times and by placing them in equations similar to  $\underline{I}$  the amount of  $X_1$  and  $X_2$  influence.

It is clear that however much  $t$  is increased; the leader and subordinates will need less time to reach interaction and balance. Therefore the two curves  $x = e^t$  and  $x = \ln t$  will become as two lines with similar slopes, interceptions that are coincident with each other; this shows the extreme success of an institute.

### Results:

A leader is an individual who is further than his own time and others obedience of him is without force and completely voluntarily. A manager, as a successful and effective leader must penetrate in to his subordinate's hearts by applying different mechanisms.

Leadership based on love and affection "EROSMATIC" when compared with charismatic leadership is noticeably more successful and effective. This is because in charismatic, the leader by using personal charismatic modes, charismatic and personal and specifics influence individuals and to make individuals of his own ideas and orders. Therefore, in charismatic leadership, the fundamental aspect is special characteristics and psychological modes of the leader but in leadership with love and affection "EROSMATIC", the foundation is on the leaders' performance, arising of affection and love "EROSMATIC" towards his subordinates.

The process of leadership based on EROSMATICS includes four essential concepts. These four concepts are:

1-**CARRING**

2-**SHARING**

3-**RESPECT**

4-**RESPONSIBILITY**

The first condition for the four terms mentioned above is "POSITIVE INFLUENCE". Leadership's foundation is based and blended with love and affection "EROSMATIC", the leader's expression of love and affection "EROSMATIC" to his subordinates must be equal. Here we can define the leadership as an influential and effective process on others, for achieving a particular goal. And to consider Eros as influence on individuals and subordinates (societies) feelings and affections, In away

that after the foundation of the leader's love and affection "EROSMATIC" toward his subordinates three essential level take place and at the end, these three level  $t$

The three essential processes of leadership blended with Erosmetics, which have been originated from the series of leadership articles are as below:

1-The initiation of expressing affection and interest towards personnel and individuals (society) from the leader.

2- The current of expression of affection and interest changes direction from individual (society) towards the leader.

3-The perfected form of this exchange is as interaction.

For developing a powerful leadership, which is a necessity for the organizations continuance, it is better to confront it systematically so to gain the time to review, control and evaluate the performance method for the leader. Some times a mathematical model however simple and partially without care can clarify a subject easily.

Statistics and contingent are considered crucial instruments for developing the quality of leadership.

Therefore by applying  $\pi_t = (p)^t = \pi_0$  we can predict the possible and complicated condition of subordinates regarding the digital amount of love and affection "EROSMATIC" expressed by the leader towards his subordinates in the future or to use it as a criteria for evaluating the performance.

In this study the below formulas were presented so to calculate the amount of the leaders influence of the leader on his subordinates.

$$\begin{array}{l}
 \textcircled{1} \quad \text{The amount of influence: } z = ab(e^{k(a-b)^t} + 1) / ae^{k(a-b)} - b \\
 \left\{ \begin{array}{l} x_1 = at_1 + b \\ x_2 = ct_1 + d \\ x_1 = e^{t_2} \end{array} \right. \quad \textcircled{2} \\
 \left\{ \begin{array}{l} x_2 = Ln t_2 \end{array} \right.
 \end{array}$$

Formula one can be also used for evaluating the leaders performance, and by derivation of this formula, the leaders and subordinates interaction point will be gained. It is at this point that "I" as a leader or subordinate is eliminated and "WE" is created. Therefore, the area after this point is the area of "RESPECT" and "RESPONSIBILITY". However the less it takes to reach this point, the leaders success will increase.

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