LEADERSHIP QUOTIENT

Deepa Mazumdar*, Gautam Mukhopadhyay**

Abstract *The Model that we propose to measure leadership capability is based on a balanced coordination of the three components of affect, cognition and effort, termed ACE. The components can be measured by assessing the individuals' emotional intelligence, job, problem solving and reasoning ability, and performance. The Model is built on the premise that the components of ACE are of equal value to indicate their equidistant which can be greater than 0 and equal or less than 1 which is considered as constant. To find the best cases, the length is calculated to determine the best individual among individuals with equidistant value of ACE.*

Keywords *Leadership Quotient, Affective, Cognitive, Effort*

INTRODUCTION

"There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things."

Niccolo Machiavelli, 1369-1427, Florentine statesman and philosopher, *Discourses*

Leadership have been mostly explained with theories and processes; few have studied the subject based on mathematical models attempting to quantify the leadership competence from diverse perspective; leadership using mathematical models have studied the complementary roles of IS- leadership and their influence on IT-enabled change in organization (Gan & Galadima, 2007), also the effects of co-operational leadership on the performance of teams considering the amount of team interaction, members migration and the leadership skills and variance (Solow & Leenwong, 2009; Mansyur & Simamora, 2010).

This paper proposes a simple formula as a measure of leadership. The formulation is based on Affective (A), Cognitive (C) and Effort (E), which we believe is the established way of assessing various human potential towards leadership. In the past, leadership potential has been examined in terms of IQ and psychomotor dexterity and most recently with EQ. In this paper, section II will give a concise definition of A, C, E, in section III, where we describe a model, for mathematically assigning the leadership competence, Section IV will give examples to illustrate this model, finally in section V we will conclude and comment on application and further possibilities

LEADER QUOTIENT

We define *Leadership Quotient* (*LQ*) as an integrated capacity to undertake responsibility with constancy and rationality. Research has shown that the cognitive component is measured in terms of intelligence quotient. The affective component is measured in terms of emotional intelligence and effort is measured by performance scorecard.

More than a century ago, in 1905 Alfred Binet proposed the Binet-Simon Intelligence Scale, which was further refined by William Stern in 1912, who coined the term 'IQ' measured in terms of mental age and chronological age, this concept was further refined by Terman in 1916, emerging with a formula of ratio IQ = 100 × (mental age/chronological age). Spearman proposed that intelligent behavior is generated by a single, unitary quality within the human mind or brain, called the *general factor***,** or simply *g***,** through a new statistical technique known as the factor analyses, analyzed the correlations among a set of variables. This technique has also demonstrated that scores on all mental tests are positively correlated; this offered compelling evidence that all intelligent behavior is derived from one metaphorical pool of mental energy (Freeman, 1962). Later in 1939, Wechsler proposed WAIS (for adults) and WISC (for children), which were based on a standardized normal curve, with 100 representing the average IQ, known better as 'deviance IQ', implying its deviation from the average score (Wechsler, D. 1997, 2003).

Gardner's (1993) theory of Multiple Intelligence initiated the transition from cognitive to emotional intelligence by including 'interpersonal' and 'intrapersonal' intelligence. Mayer and Salovey applied emotional intelligence to describe a person's ability to understand emotions of self and others (1998). Later, Goleman (1995) contributed to the widespread application, especially in the academia and management consultancy. It became an important criterion for leadership behavior.

The Model that we propose is on the basis of a balanced coordination of these three components. ACE (affect, cognition and effort) forms the basis of core resources. Although every human being has these resources in variable proportion, for leadership the distribution requires to be more or less equidistant.

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- Affect (A) represents the emotional balance, where the individual has the competence to create, maintain and sustain emotions. High emotion works as a barrier and low emotion (indifference) and in extreme cases (apathy) distances itself from effective performance.
- Cognition (C) represents the reasoning, awareness process, where the individual has the competence to know, to understand and to learn. High cognitive ability can prevent team participation; in this case the individual is better in direct leadership or task-oriented.
- Effort (E) represents the productivity, i.e. the performance and the output, where the individual has the competencies to define, set and achieve goals that will contribute to the growth.
- The Affect, Cognition and Effort together, in short, ACE acts as the means to reach the end, i.e., develop leadership competency. The efficacy of this resource lies in the distribution of A, C and E, i.e., if one increases, the other two are expected to decrease. When the difference between increasing value and decreasing values is large, then the projected output cannot be recommended for leadership, for example,
- if affect value is high, the cognitive and effort values will become low, in this case the projected output is likely to be a highly emotional individual; similarly,
- if cognition value is high, then affect and effort values will be low, then the projected output is likely to be a highly cerebral individual; finally,
- if effort value is high, and affect and cognition values are low, then the projected output is likely to be just a hard laborer.

HYPOTHESIS

The model aims to select cases which satisfy within some tolerance this requirement that A, C, and E are nearly equal and then out of them select the best. To elucidate the Model, we therefore proceed as follows:

Let A = x, C = y, and E = z, with $0 \leq x, y, z \leq k$.; and a given value for each of A, C, E, be represented by a point P, whose coordinates are xp, yp, zp as shown in the Fig. 1. The hypotheses is then based on the observation the line joining the origin O and the point P along the perpendicular to the triangular plane and hence, $OP = [(xp)^2 + (yp)^2 + (zp)^2]^{1/2} = (k/2)\sqrt{3}$ ($= \frac{1}{2}\sqrt{3}$ for k=1), is the shortest distance from the origin to the point on the triangular plane.

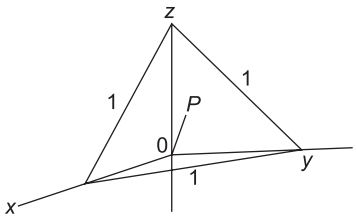

Fig. 1. Model for A, C, E. The triangular plane represents A + C + E =1.

Therefore, for a proper balance, A, C, and E should be such that they are closest to the midpoint of the triangular plane; in other words = $[x^2 + y^2 + z^2]^{1/2}$ should be minimum.

For a certain value of (x,y,z), the deviation from the ideal case of x = y = z can be measured by the angle θ,which is determined by

$$\cos\theta = (x + y + z)/[3(x^2 + y^2 + z^2)]^{1/2} = s/(l\sqrt{3}),$$

where s = (x + y + z) is the sum, and $l = [(x^2 + y^2 + z^2)]^{1/2}$ is the length representing quality. This however is not sufficient in selecting the best cases. For instance two cases (x1,y1,z1) and (x2,y2,z2), can have same value of θ (or cos θ), but values of x,y,z are different and thereby the value of s could be considerably different. The length s would then be a good measure to select the best LQ; for example, with cos θ = 1 and s maximum. The scheme is then the following:

For a set (xi,yi,zi) determine cos θi and si. Then plot si against cos θi. From the plot it will be easy to select the best as the one (n1), who will have the smallest value of θ and at the same time the largest value of LQ.

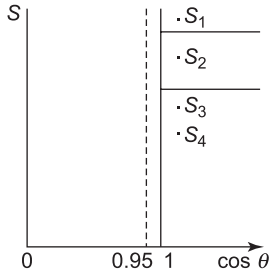

Fig. 2. Different leadership quotients with equal scores for ACE

Therefore, we define Leadership Quotient, LQ as

$$LQ = (s \times \cos\theta)$$

which is substantiated and elucidated by the following numerical example given below, where the scores x, y and z have been converted to ratios so that the maximum value of s will be 100.

Some Examples

When s = 100 or the sum of x, y, z, is 1

Example A when x + y + z =1, the scores are almost equal; x = 33.33, y = 33.34 and z = 33.33

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{1/2}$$

$$= (100) \times (33.33 + 33.34 + 33.33\ [3(33.33^2 + 33.34^2 + 33.33^2)]^{1/2}$$

$$= (100) \times 100/[3\ (1110.89 + 1111.56 + 1110.89)]^{1/2}$$

$$= (100) \times 100/100$$

$$= 100 \times 1$$

Example B when x + y + z = 1, the difference between scores is less

When x = 43, y = 27 and z = 30,

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (100) \times (43 + 27 + 30)/[3(43^2 + 27^2 + 30^2)]^{½}$$
$$= (100) \times 100/[3\ (1849 + 729 + 900)]^{½}$$
$$= (100) \times 100/\ 102.15$$
$$= 100 \times .98 = 98$$

Example C when x + y + z = 1

When x = 20, y = 20 and z = 60, when one score predominates the other scores

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (100) \times (20 + 20 + 60)/\ [3(20^2 + 20^2 + 60^2)]^{½}$$
$$= (100) \times 100/[3\ (400 + 400 + 3600)]^{½}$$
$$= (100) \times 100/\ 114.89$$
$$= 100 \times .87 = 87$$

If we consider a tolerance of 0.95, then examples A and B can be considered for leadership positions, and examples C and D can be rejected

When *s* < 100 or the sum of x, y, z, is < 1

Example D1 when x = y = z, and x + y + z < 1, x = 30, y = 30 and z = 30,

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (90) \times (30 + 30 + 30)/[3(30^2 + 30^2 + 30^2)]^{½}$$
$$= (90) \times 90/[3\ (900 + 900 + 900)]^{½}$$
$$= (90) \times 90/90$$
$$= 90 \times 1$$
$$= 90$$

Example D2 when x = y = z, and x + y + z <1, x = 25, y = 25 and z = 25,

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (75) \times (25 + 25 + 25)/[3(25^2 + 25^2 + 25^2)]^{½}$$
$$= (75) \times 75/[3\ (625 + 625 + 625)]^{½}$$
$$= (75) \times 75/\ 75$$
$$= 75 \times 1 \times = 75$$

Refer to fig. 2; D1 will be between s_1 and s_2, D2 will be just above s_3

Example E x + y + z < 1, x = 24, y = 26 and z = 25,

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (75) \times (24 + 26 + 25)/[3(24^2 + 26^2 + 25^2)]^{½}$$
$$= (75) \times 75/[3\ (576 + 676 + 625)]^{½}$$
$$= (75) \times 75/75.04$$
$$= 75 \times .999 = 74.96$$

Example F x + y + z < 1, x = 19, y = 36 and z = 28,

$$LQ = (x + y + z) \times (x + y + z)/[3(x^2 + y^2 + z^2)]^{½}$$
$$= (83) \times (19 + 36 + 28)/[3(19^2 + 36^2 + 28^2)]^{½}$$
$$= (83) \times 83/[3\ (361 + 1296 + 784)]^{½}$$
$$= (83) \times 83/85.58$$
$$= 83 \times .97 = 80.1$$

CONCLUSION

This paper has attempted to introduce a statistical formula for measuring leadership quotient. For further validation, it requires to be operationalized. The following procedure can enable the researchers to find individuals LQ by first finding the values of the ACE. *Affect* component can be assessed from emotional intelligence test, the *cognitive* component from job knowledge, problem solving and reasoning capacities, and the *effort* component from performance appraisal based on a performance scorecard.

The next step is to convert these scores into ratios, so that they sum up to a maximum score of 100. If the selection of leaders is for a particular level or hierarchy, then the tests measuring their ACE needs to be tailored accordingly, in case the selection is for the organization, then depending on the scores, the individuals, preferably falling on the margin of 0.95 to 1 cos θ (see fig. 2) where the gap between ACE scores is minimum, can be positioned to a level where they can serve the organization. We hope the LQ factor may possibly enable organizations to select their leaders more appropriately.

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