

## An AHP Approach for Selecting the Suitable leadership Style

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**Abstract.** In this paper, a mathematical framework for selecting a suitable leadership style was introduced by AHP method. First, according to leadership management literature, four criteria were identified to select the right leadership style. These are Position power, Leader-member relation, Task structure, and Followership-development. In this paper four leadership styles as alternatives were recognized based on review of literature. Here a method was developed to select the right alternative based on criteria. To do so we used a case study's data. Importance of each criteria and consistency degree of each leadership style with each criterion were calculated by pair-wais comparisons. After normalizing, priority degree of each leadership style was obtained for that case.

**Keywords:** Leadership, Contingency theories, AHP, Right leadership style

### 1. Introduction

Leadership is one of the important skills for managers that are the ability to influence a group toward the achievement of goals [24]. If you trace the success of a company back to its origin, you will see the root is always exceptional leadership. Whether it be a non-profit organization, a large conglomerate, a sports franchise, an elementary school, or a small mom-and-pop diner, leadership is the most influencing factor of achieving and sustaining success. Leadership has been described as the "process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task". In this definition social influence is very important. How is social influence happened? Every leader does it by applying leadership style. Leadership style refers to a leader's behaviour. It is the result of the philosophy, personality and experience of the leader.

The main question is "How can we recognize the right leadership style?" this paper try to answer this question. Although there is rich literature on leadership unfortunately there is no precise mathematical model to predict the desired leadership style. Identifying the appropriate leadership style has explained only in conceptual form in management literature. There can be several approaches for modelling. Since determining the right leadership style is a multiple attribute decision so in this paper an AHP approach is introduced to do it.

### 2. Literature review of research background

Trait theories are first theories in leadership. The goal was to identify sets of traits to assist in selecting the right people for positions requiring effective leadership. In response to the early criticisms of the trait approach, theorists began to research leadership as a set of behaviour. Studies conducted at the Ohio State University, and the University of Michigan identified two behavioural dimensions that point to two general types of leader behaviour. The first – consideration or employee orientation suggest emphasis on employee's feelings and interpersonal relationships. The second – initiating structure, or production orientation – suggested a focus on tasks to achieve goals. Research findings on which dimension is most important for satisfaction and productivity were inconclusive. However, employee oriented leaders appeared to be

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associated with high group productivity and job satisfaction. The dimensions identified at University of Michigan provided the basis for the development of a managerial style grid based on the dimensions; concern for people and concern for production [2]. Five styles were identified: impoverished leader, task management, middle of the road, country club management; and, and team management. Managers who scored high on both these dimensions simultaneously, labelled team management, performed best [11]. Situational theory also appeared as a reaction to the trait theory of leadership. According to the theory, "what an individual actually does when acting as a leader is in large part dependent upon characteristics of the situation in which he functions." [4] The Fiedler (1967) contingency model as the first comprehensive contingency model proposes that effective group performance depends on the match between the leader's style of interacting with subordinates and the degree to which the situation allowed the leader to control and influence. It bases the leader's effectiveness on what Fred Fiedler called situational contingency. This results from the interaction of leadership style and situational favourableness (later called "situational control"). The theory defined two types of leader: those who tend to accomplish the task by developing good-relationships with the group (relationship-oriented), and those who have as their prime concern carrying out the task itself (task-oriented) [8]. According to Fiedler when there is a good leader-member relation, a highly structured task, and high leader position power, the situation is considered a "favourable situation". Fiedler found that task-oriented leaders are more effective in extremely favourable or unfavourable situations, whereas relationship-oriented leaders perform best in situations with intermediate favourability. Victor Vroom, in collaboration with Phillip Yetton added a new model to contingency theories which named Leader-participation model [8]. they developed a taxonomy for describing leadership situations, taxonomy that was used in a normative decision model where leadership styles were connected to situational variables, defining which approach was more suitable to which situation [10]. The model is a decision tree, requiring yes and no answers that incorporate seven contingencies about task structure and five alternative styles. The revised model, Vroom and Jargo extended contingency variables to 12 [9]. Research indicates that the model is a good tool for determining the optimal degree of employee participation in decision making [1]. The path-goal theory of leadership was developed by Robert House (1971) and was based on the expectancy theory of Victor Vroom [6]. According to House, the essence of the theory is "the meta proposition that leaders, to be effective, engage in behaviour that complement subordinates' environments and abilities in a manner that compensates for deficiencies and is instrumental to subordinate satisfaction and individual and work unit performance [7]. The theory identifies four leader behaviour, achievement-oriented, directives, participative, and supportive, that are contingent to the environment factors and follower characteristics. The situational leadership model proposed by Hersey and Blanchard suggests four leadership-styles and four levels of follower-development. For effectiveness, the model posits that the leadership-style must match the appropriate level of followership-development. In this model, leadership behavior becomes a function not only of the characteristics of the leader, but of the characteristics of followers as well [5]. The Hersey-Blanchard Situational Leadership Theory is based on two fundamental concepts; Leadership Style and the individual or group's Maturity level. They categorized all leadership styles into four behaviour types, which they named selling, telling, participating, and delegating styles. In this theory the "best" style of leadership is identified concerning four individual or group's Maturity level. For effectiveness, the model posits that the leadership-style must match the appropriate level of followership-development.

Since in this paper modelling is based on contingency framework so some other theories such as attribution theory and charismatic leadership theory, transactional and transformational leadership theory, Functional leadership theory isn't considered.

### **3. Modeling process**

Selecting a suitable leadership style is a MADM decision so AHP as an important MADM's methods is used for modelling. Modelling process has four stages.

#### **3.1. Identifying the AHP hierarchy**

Modeling the problem as a *hierarchy* is the first step in the Analytic Hierarchy Process. According to contingency theories, participants explore the aspects of the problem at levels from general to detailed, then express it in the multileveled way that the AHP requires. Fig 1 illustrates the problem as a hierarchy.

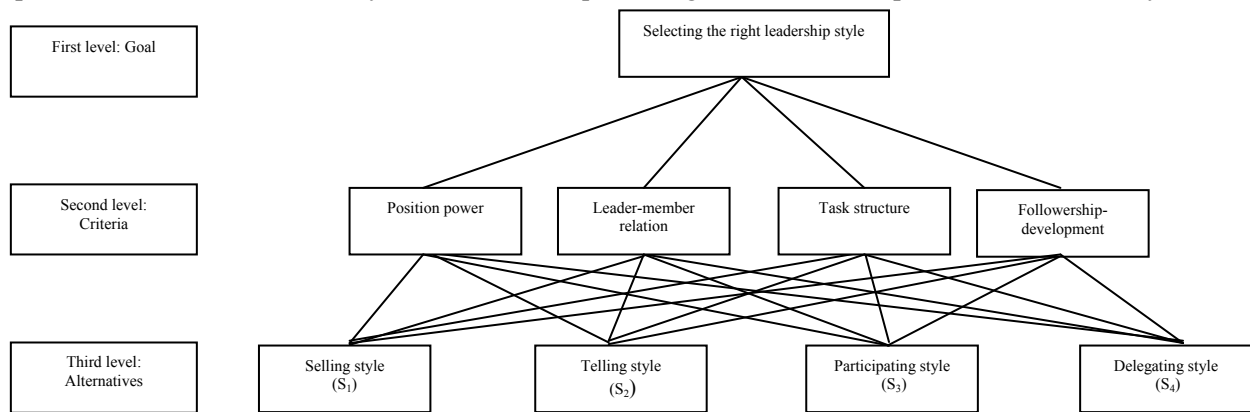


Fig 1: AHP hierarchy

### 3.2. Measuring the current contingency variables for a case

Here the magnitude of current contingency variables is calculated. This is important for pairwise comparisons. Comparing the alternatives is based on contingency variables' measures. A five-point rating questionnaire was made to identify magnitudes of four contingency variables. It is obvious that we must test questionnaire's validity and reliability before using them. Questionnaires were revised by five experts' viewpoint who were specialized in leadership field and reliability of Questionnaires was confirmed by Cronbach's alpha. Head of management school in Islamic Azad University – Tabriz branch was considered as the case study. To suggest the right leadership style for him first his fourteen subordinates' viewpoints on leader-member relation and task structure and his attitude on his position power and subordinates' Followership-development were gathered by questionnaires. Magnitudes of these criteria were calculated 0.7, 0.7, 0.6, and 0.5 respectively when minimum and maximum of them are between 0 and 1.

### 3.3. Identifying the Local and overall priorities

Local priorities are the numerical values (weights) of criteria and alternatives. The sum of weights for criteria and that of weights for alternatives must be 1. In this paper, priority of each criterion to another criterion and that of any decision alternative to another alternative was compared by pairwise comparison matrixes based on review of literature. Numbers 1,3,5,7,9 are symbols of Equally preferred, Moderately preferred, Strongly preferred, Very strongly preferred, and Extremely preferred respectively. The numbers 2, 4, 6, and 8 are half way positions between the values above. The scale assumes that the ROW (first) criterion being ranked is of equal or greater importance than the COLUMN (second) criterion. If you have a pairing where the row criterion is less important than the column, use the reciprocal value (1/2,1/3,1/4, 1/5,1/6, 1/7, or 1/9).

Following matrixes demonstrate the results of pairwise comparisons when followership – development (FD), position power (PP), leader-member relationship (L-M), and task structure (TS) are 0.7, 0.7, 0.6, and 0.5 respectively.

<i>FD</i> <i>is 0.7</i>	<i>S</i> <sub>1</sub>	<i>S</i> <sub>2</sub>	<i>S</i> <sub>3</sub>	<i>S</i> <sub>4</sub>	<i>PP</i> <i>is 0.7</i>	<i>S</i> <sub>1</sub>	<i>S</i> <sub>2</sub>	<i>S</i> <sub>3</sub>	<i>S</i> <sub>4</sub>	<i>L – M</i> <i>is 0.6</i>	<i>S</i> <sub>1</sub>	<i>S</i> <sub>2</sub>	<i>S</i> <sub>3</sub>	<i>S</i> <sub>4</sub>
<i>S</i> <sub>1</sub>	1	1/2	1/7	1/8	<i>S</i> <sub>1</sub>	1	1/3	6	6	<i>S</i> <sub>1</sub>	1	1/2	4	5
<i>S</i> <sub>2</sub>	2	1	1/6	1/7	<i>S</i> <sub>2</sub>	3	1	6	7	<i>S</i> <sub>2</sub>	2	1	5	6
<i>S</i> <sub>3</sub>	7	6	1	3	<i>S</i> <sub>3</sub>	1/5	1/6	1	4	<i>S</i> <sub>3</sub>	1/4	1/5	1	3
<i>S</i> <sub>4</sub>	8	7	1/3	1	<i>S</i> <sub>4</sub>	1/7	1/7	1/4	1	<i>S</i> <sub>4</sub>	1/4	1/6	1/3	1

<i>TS</i> <i>is 0.5</i>	<i>S</i> <sub>1</sub>	<i>S</i> <sub>2</sub>	<i>S</i> <sub>3</sub>	<i>S</i> <sub>4</sub>	<i>Leader</i> <i>ship style</i>	<i>FD</i>	<i>PP</i>	<i>L – M</i>	<i>TS</i>
<i>S</i> <sub>1</sub>	1	1/3	1/6	2	<i>FD</i>	1	1	1	1
<i>S</i> <sub>2</sub>	3	1	2	6	<i>PP</i>	1	1	1	1
<i>S</i> <sub>3</sub>	6	1/2	1	6	<i>L – MR</i>	1	1	1	1
<i>S</i> <sub>4</sub>	1/2	1/6	1/6	1	<i>TS</i>	1	1	1	1

To measure the local priorities, first the pairwise matrixes were normalized. Then averages of each row as local priority were calculated. Following matrixes illustrate normalizing matrixes and local priorities.

<i>FD</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>average</i>	<i>PP</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>average</i>
<i>S1</i>	0.055	0.03	0.08	0.02	0.051	<i>S1</i>	0.29	0.20	0.40	0.33	0.31
<i>S2</i>	0.11	0.06	0.10	0.03	0.078	<i>S2</i>	0.69	0.6	0.48	0.38	0.54
<i>S3</i>	0.38	0.41	0.60	0.70	0.52	<i>S3</i>	0.04	0.10	0.08	0.22	0.11
<i>S4</i>	0.44	0.48	0.2	0.23	0.33	<i>S4</i>	0.03	0.08	0.02	0.055	0.04

<i>L – M</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>average</i>	<i>TS</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>average</i>
<i>S1</i>	0.28	0.26	0.38	0.33	0.31	<i>S1</i>	0.09	0.16	0.04	0.13	0.11
<i>S2</i>	0.57	0.53	0.48	0.4	0.49	<i>S2</i>	0.28	0.5	0.6	0.4	0.44
<i>S3</i>	0.07	0.1	0.09	0.2	0.11	<i>S3</i>	0.57	0.25	0.3	0.4	0.38
<i>S4</i>	0.07	0.89	0.03	0.06	0.06	<i>S4</i>	0.07	0.08	0.04	0.06	0.06

<i>leader</i>	<i>FD</i>	<i>PP</i>	<i>L – M</i>	<i>TS</i>	<i>average</i>
<i>FD</i>	0.25	0.25	0.25	0.25	0.25
<i>PP</i>	0.25	0.25	0.25	0.25	0.25
<i>L – M</i>	0.25	0.25	0.25	0.25	0.25
<i>TS</i>	0.25	0.25	0.25	0.25	0.25

Overall priorities were calculated by following:

$$\begin{bmatrix} 0.05 & 0.310 & 0.318 & 0.11 \\ 0.07 & 0.544 & 0.496 & 0.446 \\ 0.52 & 0.112 & 0.118 & 0.38 \\ 0.33 & 0.048 & 0.065 & 0.061 \end{bmatrix} \times \begin{bmatrix} 0.25 \\ 0.25 \\ 0.25 \\ 0.25 \end{bmatrix} = \begin{bmatrix} 0.197 \\ 0.398 \\ 0.282 \\ 0.126 \end{bmatrix}$$

Overall priorities show the priority of each decision alternative. According to those, *S*<sub>2</sub> with score 0.398 and *S*<sub>4</sub> with score 0.126 are appropriate and inappropriate leadership style respectively.

### 3.4. Measuring the inconsistency ratio (I.R.)

If the pairwise comparison matrix is *D* and local priority matrix is *W* then the inconsistency ratio is measured by following:

$$D = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1j} \\ a_{21} & a_{22} & \dots & a_{2j} \\ \dots & \dots & \dots & \dots \\ a_{i1} & a_{i2} & \dots & a_{ij} \end{bmatrix} \quad W = \begin{bmatrix} w_1 \\ w_2 \\ \dots \\ w_n \end{bmatrix}$$

$$WSV = D \times W$$

$$CV = \frac{WSV}{W}$$

$$\lambda_{MAX} = \frac{CV_1 + CV_2 + \dots + CV_n}{n}$$

$$II = \frac{\lambda_{MAX} - n}{n - 1}$$

$$IR = \frac{II}{IRI}$$

$$IRI = 0.9 \quad FOR \quad n = 4$$

WSV=Weighted Sum Vector    CV=Consistency Vector    II=Inconsistency Index     $\lambda_{\max}$  = Eigen Value  
IR=Inconsistency Ratio    IRI=Inconsistency Ratio Index    n= Dimension of Matrix

According to above methodology, inconsistency ratios (IR) for each pairwise comparison matrixes are 0.09, 0.1, 0.07, 0.05, and 0 respectively. Since all of IRs is equal or less than 0.1 so comparison matrixes are consistence.

#### 4. Conclusions

One of the important decisions in organizations is identifying the right leadership style. Although there is a rich literature about that but there are less mathematical models to determine that. This paper is based on contingency theories. Selecting the right leadership style based on these theories is a MADM decision. One of the efficiency methods namely AHP in this filed has been used to develop a model for it. There is interrelationship between contingency variables but in AHP method these variables are considered as independent variables. Although contingency variables as criteria can be divided to sub criteria in this paper those weren't considered so future researches can be focus on this limitations.

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