

Determining the Relationship between Information Technology and Leadership Style

(Case Study: Navy Research Institute of Bandar Anzali in Northern of Iran)

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Abstract

The environment of future organizations are complicating day by day. Organizations are going to be multi cultural and global or at least in less develop countries; they are beyond of one city or province. The leaders of these organizations have to work with cultured diversity effectively any they use different styles of leadership. One of the concepts about this subject is conditional leadership which was brought up by "Paul Hery" and "Kent Blanchard". This model Forms based of employees, readiness and suggests that one of the important factors of readiness is knowledge; and for this reason today's organizations value knowledge and educated employees.

The basis of knowledge is information and the way of recording, storing, reminding, and receiving of information is changing which is named information Technology. In this research based on conditional leadership theory, it is expected to see a relationship between Information Technology and leadership style in organizations; therefore this relationship has been investigated in Navy Research Institute of Bandar Anzali.

The output of questionnaires was analyzed by use of SAS software then the hypotheses were examined by use of correlation test and by 90 percent assurance it seems that there is a meaningful relationship between information technology and leadership styles and in research Institutions like Bandar Anzali Navy research institutions, this relation is important in strategic information level.

Keywords: Leadership Style, Participative style, Despotic Style, Information Technology

1. Introduction

Nowadays, Information Technology has been transformed by use of computers, Satellites, telephone, Television and it has influenced on scientific, industrial, cultural and social life of people. This technology affects a families too in a way that in purchasing decisions, they collect their required information through communication devices, for example in first step they call to their friends or relatives and ask question about quality, price.

Technology is one of the most important subjects in Management and it is considered as one of the strategic management tools. In Strategic Management, recognition the external and internal environment of organization is necessary – without correct and enough information, the

organization will be plunged in a sea of uncertainty and thing which can decrease uncertainty is information.

Information lacking or plentitude could makes decision making simple or complicated, in a way that information is much, decision making is followed by confusion and in information lacking making process is not complete and it won't be scientific [3].

Decision making in organizations could be personal or by group, and this matter depends to the scope of delegation in organization. The delegation scope to lower categories is called decision making model or leadership style which can be influenced by applied information or information technology in organization [12].

2. Problem Definition and Research Basic Question

The ever-increasing wave of information technology use in recent years has involve Iran too; so searching in this matter is essential and the effects of information technology in organizations should be analyzed. And the thing which is important is that the expected results and use of this technology would become effective and the cost of its performance and application could be justified [6]. These are the reasons of doing this research and the basic question which will be answered in this research is that:

"What is the relation between the level of information technology and applied leadership style?"

3. Subject Importance

The concepts of organization and future have been discussed very much and consultants and proficient analyzed, examined and rebuilt the organization from different dimensions. It seems that in all of these discussions, author's consensuses at least on 2 points [8]:

- 1- Organization should change in order to survive in a changeable environment.
- 2- Future is a distinct period of time which the changes should be emerged on that.

Organization is a group of people who are working in a specialized structure for a distinctive objective and they make capital turn over possible for financial suppliers. The point which should be added to this definition is the role of empathies and feelings in handling organizations and people [7].

Managing on workers is something more than job definition or salary determination. Manager should consider the behavior of people and recognize the subtle points of their actions and behaviors. "Human is the axis of the management styles which were brought up by strategists and authors. Human Resource Managers have to use computerized software services and with correct management on productivity, education and planning; produce new statistics and diagrams which will cause humanistic work place.

4. Research Hypotheses

- 1- There is a meaningful relationship between Information Technology and Participated leadership style.
- 2- The is a meaningful relationship between Despotic Leadership style and information technology.

5. Research Objectives

The original objective of this research is to show a relationship between leadership style of an organization and information technology and this important could help manager in applying and using information technology and inform them about the related subjects in organization management and leadership based on multi cultural organizations, therefore three main subjects of this research are as follows:

- 1- Examining the situation of information technology in organizations.
- 2- Examining the varieties of leadership styles in organizations.
- 3- Examining and determining information technology requirements in order to suitable use of information.

6. Research Territory

A) Subject Territory

The subject territory of this research is information technology and leadership styles in organizations.

B) Place Territory

The place territory of this research is Navy research institute of Bandar Anzali. This office is managed by Top managers, middle manager and supervisors. These people are about 45 persons.

The applied information technologies in this institute are:

Financial Reporting System, Salary and Fees System, Industrial Accounting System Warehousing system, computerized designing system, personnel Administrative system, Project control system Intranet, and Internet.

7. Research Method

The method which is applied in this research is a combination of field and library research. Library research is mainly used for subject literature and research background, it also used for preparing a suitable framework for this subject. In research literature part, the main focus of research is on the Persian and Latin books and articles and post graduate theses. In the field method of this research, the required data was collected through questionnaire and after analyzing, obtained information was used to accept or reject the research hypotheses.

8. Words and Expressions Definitions

The main and key word which is used in this research and their definition is essential are as follows:

- Management style

A mixed of qualities, skills and manners which managers use to interact with their employees, in other words management style is stable behavioral models which managers use to work with others [12].

- Participative style

It is a collection of work process and operations which participate workers and subordinates in decision making procedure [5].

- Despotic style

In this style, leader is the only one who decides and has strict supervision on workers, activities [5].

- Information Technology

In this technology, recording, processing, transferring and receiving of information is done faster and better by using computer networks, for away communication systems and microelectronics.

9. Theoretical basis

1-9 Examining the validity and Reliability of collected data

1. Validity

The validity of questions could be justified based on valid questionnaires in organizational leadership researches [9] and examining the effects of information technology on organization structure [4].

2. Reliability

In order to examine the reliability, runback Alpha method was used and in two of questions (management and information technology), the correlation matrix was calculated individually with following formula:

$$a = \frac{N\bar{P}}{1 + \bar{p}(N - 1)}$$

In this formula, is the average of correlation numbers between x_i and x_j as $(i,j=1,2,\dots,N,j \neq i)$ and N is the number of variables.

2-9 Factorial Analysis

It is a multi-variable method which tries to justify the correlation model in an observable accidental vector distribution $x=(x_1...x_p)$ based on the minimum numbers of unobservable accidental variables called factors.

Although, the concept of Hidden Factors was proposed by Galten in 1888; Formulation and extension of factors analysis have been sourced from Psychology and relates to spearman. He supposed that the correlation of some of intelligence test grades could be produced by unique liner functions [11].

The calculation of hidden factors coefficient could be done by variant methods which two of them "main generators" and "maximum verisimilar" have the most applications. In this research, maximum very similarity was used. The factorial model which is used here for recognizing the common factors is [1]:

If we suppose that x is an observable accidental vector, then $E(x) = \mu$ and $cov(x) = \Sigma$ is a distinctive positive matrix and we supposed that each x could be written as a liner mix of m unobservable variable which $m < p$:

$$\begin{aligned} X_1 - \mu_1 &= a_{11}F_1 + a_{12}F_2 + \dots + a_{1m}F_m + \varepsilon_1 \\ X_2 - \mu_2 &= a_{21}F_1 + a_{22}F_2 + \dots + a_{2m}F_m + \varepsilon_2 \\ X_p - \mu_p &= ap_1F_1 + ap_2F_2 + \dots + ap_mF_m + \varepsilon_m \end{aligned}$$

And in the case of this matrix:

$$X - \mu = AF + \varepsilon$$

With Noticing to the hypothesis and above model and using Normal distribution of ε , the amounts of matrix coefficients could be calculated by minimizing the following function:

$$\left[-\frac{1}{2} \text{tr} \left[\varepsilon^{-1} \left(\sum_{i=1}^n (x_i - \bar{x})(x_i - \bar{x})' + n(\bar{x} - \mu)(\bar{x} - \mu)' \right) \right] \right]$$

$$L_i(M, \varepsilon) = (2\pi)^{-np/2} / \varepsilon^{-n/2} e$$

In order to turning the factors, coefficients which they could be interpreted, Varimax method was used to minimize the following matrix:

$$V = \frac{1}{p} \sum_{j=1}^m \left(\sum_{i=1}^p a^4_{ij} - \left(\sum_{i=1}^p a^2_{ij} \right)^2 / p \right)$$

3-9 the relationship among factors

After calculating the points of management factors and using information technology, the relationship among these factors was examined. Examining this relationship has been done by examining correlation coefficient.

In this case, with Pearson correlation coefficients and P=0 Test, we want to answer to this question is there any meaningful statistical between leadership styles and using information technology?!

Zero hypothesis substituting hypothesis and are as follows:

$$\begin{aligned} &\text{Substituting} \\ &\begin{cases} H_0 : P = 0 \\ H_1 : P \neq 0 \end{cases} \end{aligned}$$

$$T = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \approx t_{(n-2)}$$

$$P\text{-value} = \Pr(|T| > t_{(n-2), \alpha})$$

10. Analysis Findings

1-10 Questionnaire Reliability

After filling up the questionnaires by people, the Cronbach Alpha was calculated and you can see the result in Table (1):

Questions	Cronbach Alpha
Questions related to leadership style	0.763
Questions related to information technology	0.686

Table (1): Examining the reliability of questions

As you can see in Table (1), the questions relates to leadership styles have a suitable reliability (more than 70 percent) and the questions relates to information technology have a good reliability too (move than 50 percent); so the collected data has high internal compatibility.

2-10 Statistical Analysis of Findings

A) Questions relates to leadership styles

First as you can see in table (2), meaningful test has been done to examine that if is a common factor among questions or not? And it is observed that the P-value is low. It means that the H_0 hypothesis was not accepted or in other words there are common factors among questions. Then in order to find these factors, table (3) was formed and main factors selection was done until reaching to 0.947 in cumulative ratio.

Test	Freedom Degree	X^2	P-Value
H_0 : There is not common factor	55	141.058	Lower than 0.0001
H_1 : otherwise			

Table (2): Meaningful testing of existing common factors based on 37 observations relates to leadership Styles questions.

Cumulative ratio	Ratio	Difference	Special amounts
0.763	0.763	6.411228	8.447828
0.947	0.184	0.94847	2.0366
1.0453	0.983	0.212725	1.08813
1.1243	0.791	0.631603	0.875404
1.1463	0.022	0.174878	0.243802
1.1526	0.0062	0.2112	0.68993
1.1392	-0.0134	0.12078	-0.14828
1.1149	-0.0243	0.064076	-0.26906
1.0848	-0.0301	0.12299	-0.111
1.0436	-0.0412	0.26501	-0.45612
1	-0.0436		-48262

Table (3): Analyzing the factors of leadership styles questions

Now based on table (4) and with noticing to P-value amount, we can see that hypothesis has not been rejected.

Test	Freedom degree	X^2	P-value
H_0 : Two factors are meaningful	37	28.7787	0.7214
H_1 : more factors are needed			

Table (4): Meaningful testing of enough selected factors for results interpretation.

A) Nomination of leadership styles data factors

The coefficients of questions for each factor has been shown in table (5).

As it is clear from the questions weights, for the first factor. Questions number 7 and 8, have the minimum weights and for the second factor, these questions have the maximum weights; so it was specified that the first factor could be called "Participative leadership style factor" and the second factor could be called "Despotic leadership style factor".

These names could be caused as communicational behavior style factor and functional behavior style factor too, but because in this research, the theory of "Paul Hersy" and "Kent Blanchard" was used, so the above names preferred.

Question	First factor	Second factor
1	0.57033	-0.15897
2	0.41761	-0.10516
3	0.47831	-0.11632
4	0.50607	-0.35456
5	0.27744	-0.63756
6	0.35291	-0.55711
7	-0.19968	0.36311
8	0.8083	0.92037
9	0.70207	-0.13457
10	0.72527	-0.13799
11	0.76231	-0.42665

Table (5): Coefficients of turning factors relates to leadership styles questions.

B) Questions Relates to Information Technology

For these questions, like leadership questions, first the existence of common factors among variables was examined and with a low amount of P-value, it is proved that H_0 hypothesis was not true, based on table (7), we can see that with choosing the first and second factors, which their special amounts are more than one, the cumulative ratio is 94 percent. In table (8), the amount of P-Value is high, it means that H_0 hypothesis could not be rejected so these two factors are enough.

Test	Freedom degree	X^2	P-value
H_0 : There are not common factors H_1 : other wise	36	68.4315	0.0009

Table (6): Meaningful Testing of existing common factors based on 37 observations.

Cumulative Ratio	Ratio	Difference	Special amounts
0.6953	0.6953	2.868039	4.483984
0.9459	0.2506	642355	1.615945
1.0969	0.151	0.576851	0.97359
1.1584	0.615	0.044637	0.396739
1.213	0.546	0.434	0.352108
1.1515	-0.013	0.232999	-0.08189
1.0807	-0.049	0.141726	-0.31489
7	-0.071	0.63539	-0.45662
	-0.081		-0.52016

Table (7): Analyzing the questions relates to Information Technology.

Test	Freedom degree	X^2	P-value
H_0 : Two factors are meaningful H_1 : More factors are needed	19	17.885	0.5301

Table (8): Meaningful testing of enough selected factor for results.

C) Nomination of Information Technology data factors

The coefficients of questions for each factor are table (9). In first factor, the weight of question number 13 which shows the supportive information of decision making is remarkable so the first factor caused as " Supportive information technology of strategic decisions factor" and in the second factor, question number 16 has the maximum weight which shows the existence of information in operational level, so it could cawed as " information technology in operational decisions level factor".

Question	First factor	Second factor
12	0.55416	0.01643
13	0.78244	0.29374
14	-0.02202	0.37714
15	0.51484	-0.13713
16	0.10031	0.99496
17	0.19966	0.43987
18	0.42994	0.11915
19	0.56454	0.45238
20	0.22806	0.066

Table (9): Coefficients of turning factors relates to in formation Technology questions Question

11. Statistical Analysis of Hypotheses

Hypothesis (1): "There is a meaningful relationship between Information Technology and Participative leadership style"

Zero hypothesis and Substituting hypothesis are as follow:

$$\begin{cases} H_0 : P = 0 \\ H_1 : P \neq 0 \end{cases}$$

	X_1	X_2	Y_1
X_1	1	$\frac{0.02485}{0.8926}$	$\frac{0.4748}{0.006}$
X_2	$\frac{0.02485}{0.8926}$	1	$\frac{0.07354}{0.6892}$
Y_1	$\frac{0.4748}{0.006}$	$\frac{0.07354}{0.6892}$	1

Table (10): Pearson Correlation coefficient of Technology with Participative leadership style.
P=0.P-value Test

As you can see in table (10), P-value amount in supportive information technology of strategic decisions is so low but in the second factor it in not like that. So the relation of X_1 and Y_1 is remarkable or in the other words in the level of 99 percent, there is a meaningful relationship between participative leadership style and supportive information technology of strategic decisions, however in the operational decisions level, this hypothesis is not true.

Hypothesis (2): "There is a meaningful relationship between Despotoc leadership style and information Technology".

H_0 And H_1 hypotheses are as follows:

$$\begin{cases} H_0 : P = 0 \\ H_1 : P \neq 0 \end{cases}$$

	X_1	X_2	Y_1
X_1	1	$\frac{0.02485}{0.8926}$	$\frac{-0.42221}{0.0161}$
X_2	$\frac{0.02485}{0.8926}$	1	$\frac{-0.01021}{0.9558}$
Y_1	$\frac{-0.42221}{0.0161}$	$\frac{-0.01021}{0.9558}$	1

**Table (11): Pearson Correlation coefficient of technology with despotic leadership style.
P=0, P-value Test**

As you can see in Table (11), P-value amount of supportive information technology of strategic decision is so low but in the second factor it is not like that; so it seems that with 95 percent there is a meaningful relationship between despotic leadership style and supportive information technology of strategic decisions. However this hypothesis in the operational decisions level is not true.

12. Conclusion

Hypothesis (1):

This hypothesis shows the relationship between information technology and participated leadership style; It seems that applying information technology in an organization is in a same direct with predicated leadership style. It means that more information technology.

Hypothesis (2):

By testing this hypothesis, it seems that despotic style makes a background for applying less of information technology or in other words information technology can't be used when the leadership style is despotic.

13. Suggestions

In order to apply information technology:

- 1- The culture of applying it should be stretched in organization.
- 2- The results of this applying should be anticipated.
- 3- Related leadership style should be applied.
- 4- Detailed planning should be done in applying processes.
- 5- Before any investment, the need of organization to this technology should be examined.
- 6- The need of organization different parts to different levels of technology should be determined.
- 7- Execution obstacles of hardware, software, communication, and information should be removed.

Works Citation

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