



# **Study of the Effects of Ranking Factors on Strategic Thinking of Top Managers of Small Firms by Applying AHP Method: Case Study, Dairy Industry in Tehran**

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

This study aims to rank the factors affecting the strategic thinking of top managers of small firms by applying analytical hierarchical process (AHP) through the accomplishment of a case study in the dairy industry of Iran. It is practical by purpose and in terms of collection, it is descriptive, as an expert measurement option. Statistic population of this research included all of the top managers of small firms in the dairy industry of Tehran. The sample size of the study is selected, based on the measurement expert method as 15 individuals. Accordingly, a pairwise questionnaire is distributed among participants, in order to define the ranking factors affecting strategic thinking, by using the purposeful method. Meanwhile, the validity of the questionnaire content has been corroborated by expert professors. Accordingly, inferential statistics AHP technic was used for the winnowing of ranking factors affecting strategic thinking. The results of this study showed that among factors affecting strategic thinking, individual factors have the greatest ranks and the most relevant important factor is the driver of strategic thinking. Similarly, among the components of organizational factors, the reward system has the highest rank. Meanwhile, among individual factors components,

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the criterion of bearing the risk has the greatest rank. Among intuitive factors, creativity has the highest rank and among the systemic view, hypothesizing is regarded as the most important component.

*Keywords: Strategic thinking; AHP; hierarchical method.*

## 1. INTRODUCTION

As the competition between present-day industries gets fiercer, the importance of the studies related to development, formulating and running the strategies has been increased. Increase in change rate in the internal and external environment of production organizations lead to greater attention to devising and managing strategies in the organizations. As the production organization call for effective competition in the local, regional and global markets, thereupon they have to determine their strategic priorities and on this basis, devise and run pertinent strategies, to hold together their thriving and survival [1]. The basis of strategic programs is the analysis of data, and this thinking style (convergent thinking) lack the necessary wield for creativity (divergent thinking) as the main overview of revamping strategies. In a relevant paper, the results refer to this reality that strategic planning, due to its analytical nature bring about the administrative program, and not a strategy; however, what makes strategies efficient is the creative synthesis. Turner also states that our capability to predict the future is limited when the world is in hasty and unpredictable change, and there is no control over required vital resources, the organizations cannot formulate and implement the strategies [2]. Therefore, strategic thinking in the wavering and unpredictable present-day environment is considered as one of the leadership pertinent approaches [3]. Strategic thinking included parsing the firm strategic milieu which specifies a perspective of firms' future Strategic planning. Using such ideas is about regulating commercial plan. Although many firms outperform in strategic planning; however, insignificant number of them allocated sufficient resources to strategic thinking, so that this leads to strategic mania (to put differently, with expecting different outcomes, the firms wields similarly strategies again and again) for inculcating the strategic milieu within a firm, the firms managers and other personnel should be interested in active involvement in firm strategic decision. However, it is not that everyone enjoys such skills, similarly, many firms lack didactic plans for the labour force. This

study empirically shows that how firm strategic behaviour is affected by such inculcations. Two groups of people with similar conditions are considered as the start point. Only the members of one of the groups have received before game some behaviours which involve a didactic process. The aim of such didactic behaviours is inculcating strategic thinking. The obtained results showed significant hype in the number of strategic decisions of experiment group, which is in fierce contrast with the control group; control group corroborates the primary hypothesis (i.e., the positive effect of training).

Strategic thinking is raised for clearing the wielded approaches of traditional strategic planning and removing the flaws. However, skimpy studies are carried out about the process and the way in which one engages in the planning process. For example, Stubbart has pointed out the vital importance of management thinking yet didn't address the available elements in strategic decision making. He stated that since strategic management deals with studying the managers' activities, why scholars don't allocate more research to studying the managers thinking modality. Similarly, Garratt also highlighted more studies and stated that one underestimated strategic thinking studies. A group of experts (conference authors) in the U.S. have introduced strategic thinking as one of ten important and critical subjects of future study of management [4].

Along with this, empirical studies also confirmed the need to further studies in the context of strategic thinking. For example, Garratt pointed out that most managers and assistants of London managers' association haven't seen any argument, logic or training for acquiring the qualification of guiding their business. Similarly, Bonn showed that the majority of top managers of 35 firms among 100 big manufacturers of Australia deems the lack of strategic thinking as their organization main issue [5].

Above review showed that in spite of the introduction of strategic thinking word during recent years skimpy studies have dealt with it

and it is imperative to carry out more studies better understanding this concept. Such understanding is an important brass ring in strategic management studies and helps us to establish a more realistic picture of strategic strategies and strategic decision makers. Moreover, it helps administration management in the development of strategies for enhancing strategic thinking in the organization. Since without understanding and defining the concept of strategic thinking like strategic planning risk of introduction of new works to the lexicon of strategic management would be irrelevant. Therefore, effort along clarifying strategic thinking is imperative for scholars of this ambit. The majority of studies in the ambit of strategic management fail to address the dimension of the concept of decision making which deals with strategic decision makers thinking [6]. Therefore, the importance of carrying out such studies along enhancing the wherewithal level of strategic decision makers is out of the question. This study based on previous works on the strategic decision making tries to examine the importance and ranking the factors affecting the strategic thinking of top managers of small firms (dairy industry in Tehran).

## **2. THEORETICAL BACKGROUND AND FRAMEWORK**

In this section, the researcher has reviewed studies accomplished in the area of research. Therewith, the main concept of the present study is also explained.

### **2.1 Strategic Thinking**

Strategic thinking is a creative and divergent process and it is related to perspective designed by organization leaders.

Gertes assays that the role of strategic thinking acts as a tool for contraption and visualization of a new future. These concepts are very different for the organization which may mount them up to redefinition of main strategies and even industries, in which the firm works [7].

Strategic thinking is: using various mindsets most of which are unexplored for examining and finally decision making of strategic situations [8]. Strategic thinking is known as an individual activity which permeates in people [9].

Strategic thinking enables the manager to understand which factors are effective to achieve

the intended goals, and why and how the effective factors create value for the client? This insight into influential factors in value creation brings about discern. Without this discern the mere resources (material and non-material) of the organization has no avail for achieving success [10].

In another relevant study, the strategy contraption is defined with two indexes of new value creation for customers and the creation of new wealth for stakeholder [11]. Therefore, it assays with the prerequisite of survival and thriving of firms in wavering and revamping environment of the present day. Authors underline that this approach doesn't represent knotty solutions, reversely, in knotty contexts; the order comes from simple yet deep rules.

Strategic thinking and planning include a strategic application that alongside it, strategic thinking is imperative and it cannot be used without strategic thinking. From the other side, strategic planning always includes performance appraisal [12]. The main rebuke to the traditional view is that always it includes the imagination and measuring of intended goal in the organization and has no strategic thinking and this is why the traditional strategic planning is rebuked by academic experts. Similarly, those who always state that strategic planning just serves to fixed factors and only it affects the objectives in organization in a marginal way, they are making mistake while these people eschew to wiled strategic planning along with strategic thinking yet it is one of the aspects of strategic planning that is an unwavering part of strategic thinking [13].

### **2.2 Literature Review**

In one study entitled as "The Effect of Strategic Thinking Components on the Desire to Organizational Learning in Sport Organizations", using a Structural Equation Modeling Model [14], on a sample of 138 employees from the Sports and Youth Departments and Fars sports teams realized that all elements of strategic thinking (thinking in time, system thinking, intelligent opportunism, strategic determination and advancement based on scientific approach) had a positive and significant effect on the willingness to organizational learning among staff members, Sports departments and youth and sports teams of Fars province. Similarly, in another study titled as "determining the factors constituting the construct of strategic thinking"

[15], with the literature review of strategic thinking and extraction of related parameters, the comprehensive model of elements of strategic thinking is presented, as a cornerstone for designing a touchstone of full-fledged measuring for managers and planners. Based on this study, the main elements of strategic thinking includes: systematic thinking (dynamic-holistic), attention to dialogue and relations, attention to environment, problem solving, entrepreneurship intuition, hypothesis orientation, attention to stakeholders, entrepreneurship thinking, by the focus on the aim and perspective, smart opportunism, proactivity and environment creation, innovation and creativity. Findings of another relevant study titled as "determining the amount of adjustment of thinking of managers with strategic thinking parameters" in Qom province water and sewage firm [16] suggest that critical thinking exists at its average level, among the managers of that firm. Meanwhile, relevant findings showed that the level of average variables for strategic thinking in studied statistical samples was calculated as 3.07; which suggest the existence of strategic thinking to its average extent among the firm managers. Similarly, study findings showed that the parameter of thinking in time had the greatest average level and perspective parameter, had the least average.

In another relevant study titled as "strategic thinking measurement, based on Jin Lidka's model with the systemic approach", which is carried out on Gachsaran Behmoush firm managers [17], he reported that managers of this industrial unit used strategic thinking at a desirable degree. In this study, they used a questionnaire with 46 questions, in two forms: one is related to horizontal perspective and another to vertical one. In another paper with analytical and review nature under the banner of "implementation of strategic thinking in supply chain management" [18], they stated that by establishing a new procedure in global economic setup and relying on the strategic planning and thinking; they had compared these elements with each other and conflated them for bringing about a powerful competitive tool. They concluded that strategic thinking in the supply chain should be addressed seriously. In one study titled as "strategic thinking background and results" [19], with examining the factors affecting on strategic thinking in organizational level within various contexts of management, such as marketing strategy, strategic management and human resource management showed that the outcome

of market chaos and technology turbulence is the promotion of strategic thinking at organizational level, and there is a positive link between strategic thinking and marketing performance. The results of another study [20], carried out on 9 strategic groups of top managers, mayors and new-founded association managers in Queensland of Australia, showed that the members of the strategic group use strategic thinking in the organizational strategic development process. The findings of this study confirmed the thinking about stable competitive benefits, holistic view, creative thinking and long-term thing, as the pillars of strategic thinking among strategic group members.

In another study titled "strategic thinking and knowledge management in the organizations located in the U.S." [21], they introduced a number of key components. This paper succinctly discussed the relations between strategic thinking, strategic planning and innovative strategy and suggests that pertinent and effective strategic thinking can effectively respond to present-day commercial environment changes. Similarly, knowledge management is assayed as the key factor in increasing and improving strategic thinking through experience and insight with regard to organization units and decision-making points. Another analytical study titled "strategic thinking development" [22, 23], showed that strategic thinking is considered as a flowing process in the organization. As they assert, it seeks a difference in finding a new opportunity. Therefore, Prospective features and collaborative activity can help the development of strategic thinking in organizations. The study results showed that strategic thinking should not only be considered as an annual program; but yet it should be considered as a long term process.

### 2.2.1 Analytical hierarchical process

The AHP coined for first time in 1980 by Thomas El Saati is one of most comprehensive designed systems for decision making with multiple criteria as this technic allows the formulating the problem in a hierarchical manner and considers various qualitative and quantitative criteria. This process incorporates various options in decision making and can parse the sensitivity on criteria and sub-criteria. Moreover, it is based on pairwise juxtaposition which greases the wheel of judgement and calculation. Similarly, it shows the amount of compatibility and incompatibility that is among the prominent benefits of this

technic in multi-criteria decision making. Additionally, it enjoys a strong theoretic basis and it is based on obvious principles and in the following it clarifies these principles.

### 2.2.2 The principles of AHP

Saaty, the founder of this approach states four following principles as the cornerstones of AHP and found all of calculations and regulations on these principles. These principles are:

**Principle 1:** Reciprocal condition, if the preference of element A on element B is equal to  $n$ , the preference of element B on element A would be  $\frac{1}{n}$ .

**Principle 2:** Homogeneity, element A with element B should be homogeneous and comparable. Put it differently, the superiority of A on B cannot be infinite or zero.

**Principle 3:** Dependency, each component of AHP depends on the component at a higher level and this dependency may be continued linearly to the highest level.

**Principle 4:** Expectations when a change occurs in hierarchical setup, the appraisal should be repeated.

### 2.2.3 Weight calculation

In AHP, the elements of each level with regard to the related higher element are compared in a pairwise manner and their weight is calculated. Accordingly, these weights are named "relative weights". Meanwhile, by the conflation of relative weights, the final weight of each option would be specified, which is referred to as an absolute weight.

The acceptable ambit of incompatibility in each system hinges on the decision maker. However, in general, Thomas El Saaty suggested that if the decision incompatibility is greater than 0.1 it is better that decision maker revise his judgements. We will discuss in the following about the measurement methods of matrix incompatibility.

For calculating the relative weight in incompatible matrix many methods are

discussed for example estimation approach and minimum squares and special vector and the estimation methods are divided into several approaches:

1. Row set
2. Column set
3. Arithmetic average
4. Geometric average

In this study arithmetic average approach issued for calculation of effective factors weight.

### 2.2.4 Arithmetic average approach

In this approach, firstly, each column is normalized and then the elements of row average are calculated in order to obtain the weight vector. The researcher has derived the following relation, In order to calculate the compatibility rate (I.R), the researcher has derived the following relation:

$$I.R. = \frac{I.I.}{I.I.R}$$

### Equation 1-3

I. I denote the incompatibility index: I. I.

$$I.I. = \frac{\gamma_{max} - n}{n - 1}$$

### Equation 2-3

N: denotes matrix dimension

$\gamma_{max}$ : Denotes the average of greatest special value

I.I.R: random inconsistency index

## 3. STUDY METHODS

The type of this study is practical by purpose and the objective of practical studies is the development of applied knowledge in a particular context. Similarly, this study is of exploratory field studies, as the data of the study are garnered by the presence in the population or statistical sample and with questionnaire tool and in terms of data collection it is descriptive and it

**Table 1. Index of random matrix inconsistency**

n	1	2	3	4	5	6	7	8	9	11
I.I.R	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.45

Ref: Qodsipour, 2013

is hierarchical analysis. The statistical population of this study is made up of all expert top managers of small dairy industry firms in Tehran which are expert in the context of the subject of this study. In this study by purposeful sampling method, some individuals are singled out from firms' top managers for filling the questionnaire of the technic of AHP including pairwise comparison matrix. Similarly, in APH technic, the pairwise matrixes should be compatible, for doing so, they calculated the matrix consistency rate and this rate should not be greater than 0.1. if the number of samples is more than 15, there is no need to the calculation of consistency rate and in sum, the matrixes are compatible, since the approach of this study is the expert measurement, for doing so, the number of samples for purposeful sampling is 15 people. In the studies of strategic thinking, mostly, the experts have several years of background of management in the industry or intended firm are identified as an expert. In this study, it has been

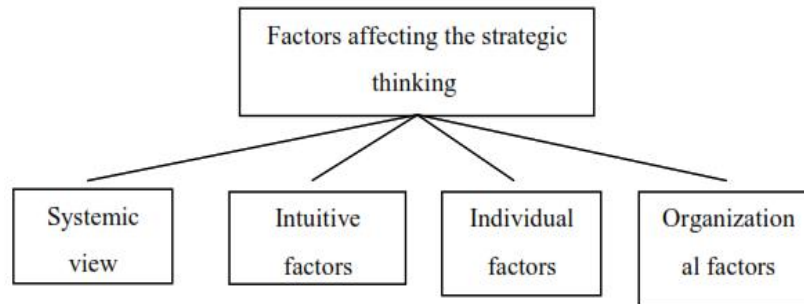
tried to identify the top managers with experience of more than 5 years in the context of strategic thinking through counselling with HRM of food industry firms. Thus, the questionnaires are distributed among 15 top managers who are introduced as the expert on this subject.

#### 4. STUDY FINDINGS

##### 4.1 Calculation of Weight and Ranking of Factors Affecting on Strategic Thinking

###### 4.1.1 First step: Building model and structuring the problem

The first step in the AHP process is establishing a graphical representation of the problem, above all, one finds the general aim of the problem and in subsequent levels, there are



**Fig. 1. Hierarchical tree of factors affecting the strategic thinking**

*Ref: From study of Farhangi and Dehqan Nayeri (2010)*

Sub-criteria	Criteria
Presenting feedback Hypothesis Cyclic thinking Holistic	Systemic view
Intuitive ability Abstract thinking Creativity Perspective	Intuition factors
Organizational setup Reward system Group homogeneity Group conflicting	Organizational factors
Perceptual system Risk tolerance Ambiguity tolerance High ambition Opportunity purposeful	Individual factors

criteria and options. Although a fixed and finalized rule cannot be allocated for depicting the hierarchy, however, some try to set some general rules in this regard.

#### 4.1.2 Second step: Pairwise comparisons

After designing the model of the hierarchical framework and identifying the relationship between ranking components, now the matrix of pairwise comparisons of sub-criteria and criteria is established like AHP model based on the value between 1 to 9 given to the objective. The results of the pairwise comparison in this stage of the average of presented opinions of the experts and from Super-decisions software.

#### 4.1.3 Third step: Weight calculation

Using the weighted average method, we calculate the weight of each of the factors. First, we normalize each column.

After doing calculations in Table 4 is obtained.

Then, the author has acquired the average value for each factor. Results are mention in Table 5.

As you can see, individual factors have the highest weight. Meanwhile, organizational, intuitional factors and systemic view have the greatest weight, respectively.

**Table 2. Pairwise comparisons of criteria the average of experts' opinions**

Criteria	Organizational factors	Individual factors	Intuitive factors	Systematic view
Organizational factors	1	1.2	2	2
Individual factors	2	1	2	3
Intuitive factors	1.2	1.2	1	1
Systematic view	1.2	1.3	1	1

**Table 3. Normalized paired comparisons**

Systematic view	Intuitive factors	Individual factors	Organizational factors	Criteria
2	2	1.2	1	Organizational factors
$\frac{2}{2+3+1+1}$	$\frac{2}{2+2+1+1}$	$\frac{1.2}{1.2+1+1.2+1.3}$	$\frac{1}{1+2+1.2+1.2}$	Individual factors
3	2	1	2	Intuitive factors
$\frac{3}{2+3+1+1}$	$\frac{2}{2+2+1+1}$	$\frac{1}{1.2+1+1.2+1.3}$	$\frac{2}{1+2+1.2+1.2}$	Systematic view
1	1	1.2	1.2	
$\frac{1}{2+3+1+1}$	$\frac{1}{2+2+1+1}$	$\frac{1.2}{1.2+1+1.2+1.3}$	$\frac{1.2}{1+2+1.2+1.2}$	
1	1	1.3	1.2	
$\frac{1}{2+3+1+1}$	$\frac{1}{2+2+1+1}$	$\frac{1.3}{1.2+1+1.2+1.3}$	$\frac{1.2}{1+2+1.2+1.2}$	

**Table 4. Computational results of normalized paired comparisons**

Criteria	Organizational factors	Individual factors	Intuitive factors	Systematic view
Organizational factors	0. 25	0. 21	0. 33	0. 28
Individual factors	0.50	0.43	0. 33	0. 43
Intuitive factors	0. 12	0. 21	0. 17	0. 14
Systematic view	0. 12	0. 14	0. 17	0. 14

**Table 5. Strategic thinking factors**

Criteria	Weights	Final weights
Organizational factors	0.2700	0.27
Individual factors	0.4220	0.42
Intuitive factors	0.1630	0.16
Systematic view	0.1450	0.15

Herewith, Inconsistency Rate for Paired Comparisons Factors Affecting Strategic.

The thinking was also calculated:

$$A = \begin{bmatrix} 1 & \frac{1}{2} & 2 & 2 \\ 2 & 1 & 2 & 3 \\ \frac{1}{2} & \frac{1}{2} & 1 & 1 \\ \frac{1}{2} & \frac{1}{3} & 1 & 1 \end{bmatrix}$$

$$A \times W = \begin{bmatrix} 1 & \frac{1}{2} & 2 & 2 \\ 2 & 1 & 2 & 3 \\ \frac{1}{2} & \frac{1}{2} & 1 & 1 \\ \frac{1}{2} & \frac{1}{3} & 1 & 1 \end{bmatrix} \times \begin{bmatrix} 0.2700 \\ 0.4220 \\ 0.1630 \\ 0.1450 \end{bmatrix} = \begin{bmatrix} 1.0970 \\ 1.7230 \\ 0.6540 \\ 0.5823 \end{bmatrix}$$

$$\gamma_1 = \frac{1.0970}{0.2700} = 4.063$$

$$\gamma_2 = \frac{1.7230}{0.4220} = 4.082$$

$$\gamma_3 = \frac{0.6540}{0.1630} = 4.012$$

$$\gamma_4 = \frac{0.5823}{0.1450} = 4.016$$

$$\gamma_{max} = \frac{4.063 + 4.082 + 4.012 + 4.016}{4} = 4.043$$

According to relation 1:

$$I.I. = \frac{4.043 - 4}{4 - 1} = 0.014$$

And according to relation 2

$$I.R. = \frac{0.014}{0.9} = 0.016$$

If it is seen, the incompatibility rate for this matrix is less than 0.1. Therefore, its incompatibility is acceptable.

Similarly, for all of the following components related to factors influencing strategic thinking, the output of the software is as follows:

## 4.2 Ranking of the Elements of Organizational Factors

As can be seen, the reward system has the greatest weight, then the group's homogeneity elements, group conflict, and organizational structure have the greatest weight, respectively. Also, the incompatibility rate of this matrix is 0.013, which is less than 0.1, so its incompatibility is acceptable.

## 4.3 Ranking Elements of Individual Factors

As can be seen, risk tolerance has the highest weight, then they have the highest levels of thinking, purposefulness, opportunism, perceptual system and ambiguity tolerance respectively. Also, the incompatibility rate of this matrix is 0.013, which is less than 0.1, so its incompatibility is acceptable.

## 4.4 Ranking Elements of Intuitive Factors

As can be seen, creativity has the greatest weight, then the elements of intuitive ability, perspective and abstract thinking have the greatest weight. Also, the inconsistency rate of this matrix is 0.023, which is less than 0.1, so its incompatibility is acceptable.

## 4.5 Ranking System of Visibility Elements

As can be seen, the hypothesis has the highest weight, then the elements of holistic, feedback, and cyclic thinking have the greatest weight. Also, the incompatibility rate of this matrix is 0.008, which is less than 0.1, so its incompatibility is acceptable.

**Table 6. Weights of the elements of organizational factors**

Final weights	Elements
0.36	Reward system
0.32	Group homogeneity
0.16	Group conflict
0.16	Organizational Structure



**Table 7. Weights of elements of individual factors**

Final weights	Elements
0.28	Risk tolerance
0.27	Thinking
0.15	Purposefulness
0.13	Opportunity
0.09	Perceptual system
0.08	Tolerance of ambiguity

**Table 8. Weights of elemental intuitive factors**

Final weights	Elements
0.34	Creativity
0.28	Q`
0.21	perspective
0.17	Abstract thinking

**Table 9. Weights of systemic view**

Final weights	Elements
0.36	Hypothesis
0.33	Wholeness
0.17	Provide feedback
0.15	Cyclic thinking

## 5. DISCUSSION

Winnowing the garnered information through a questionnaire at inferential analysis level is done using AHP technic with prioritizing the factors affecting strategic thinking. At the first step, given the previous research findings and opinion of professor the factors affecting the strategic thinking have been pinpointed and in the following using the AHP technique the affective factors have been prioritized. As you observed, the individual factors have the greatest importance on the strategic thinking of top managers of small firms in Tehran dairy industry then organizational and intuitive factors and the systematic view is the greatest weight and importance.

## 6. CONCLUSION

In this study titled as the ranking of factors affecting the strategic thinking of top managers of small firms with the method of AHP, the case study of the dairy industry in Tehran has been reviewed.

The study has two questions which are devised based on study conceptual pattern. The necessary information in this study are garnered using library study methods including books, magazines as well as use of internet and pairwise comparison questionnaire. Similarly, among organizational factors, the reward system parameter has the highest rank and among individual factors the parameter of risk tolerance and among intuitive factors, creativity and also among systemic view parameters the hypothesis has the greatest importance and highest rank.

## 7. SUGGESTION AND RECOMMENDATIONS

It is recommended to managers to given the developed model and importance of its variables deal with the space design in such manner that triggers the realization of strategic thinking in the organization and nail down its survival in the present-day wavering environment. Similarly, it is needed to underscore the organizational recruitment on individual and intuitive and systematic factors of volunteers of hiring along recruiting empowered personnel.

The managers are recommended to bolster the strategic thinking in personnel, and bring about the organizational setup for how people communicate in the organization, pertinent rewarding system and relation of rewards with set of duties and beyond-role activities, conflation of people in the groups and constituted teams in the organization for group homogenous and decreasing group conflicts.

For bolstering the strategic thinking, the managers are recommended to plough the way to increase personnel perceptual system that is how to perceive and have the impression of the surrounding world, increase of ability, bearing the risk and increasing the ability to take on the ambiguity from uncertainty, ambition, opportunism, and purposefulness in personnel.

For fostering the strategic thinking in personnel, the managers are proposed to try set the stage for giving rise to ability to set forth feedback of personnel that is, the reflection of behavior results and decision of people, increasing the ability to hypothesize, that is, having methodology of scientific study in the mind, ability to cyclic thinking namely seeing things and

toiling for getting through the process, increasing holistic ability that is seeing the systems as a whole beyond all parts in personnel.

The managers are recommended to set the stage for increasing the intuitive ability that is mental and metaphysical abilities, establishing the abstract thinking that is the ability to abstract thinking, increasing creativity and perspective in personnel.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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