

Analyzing Method of Management Conflict Based on Markov Chain

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Abstract In this article, the authors analyzed the characteristics of Markov Chain management conflict and evaluated the management conflict, which was based on the Markov Chain management conflict theory. The authors expressed management conflict behavior through the form of transferring state to probability and constructed transfer matrix via changes between different levels in staff conflict. The article reached the conclusion that the steady state distribution of Markov Chain could demonstrate the extent that the staff could ultimately reach, offering a new perspective for the research of the theory of management conflict.

Key words Management conflict; Markov chain; Model analysis

1 Introduction

The theory of management conflict was derived from western countries, China's many experts and scholars also have made an in-depth study on it. In the study of early management theory in the west, only the relevant contents have been involved in the conflict, lacking of direct study on the conflict. After 1960s, scholars conducted extensive studies of the conflict and achieved substantive results. In the original theoretical studies at the beginning, the conflict was only discussed as an important content, such as Ross A. Mebber's Organization Theory and Management, which was finished in the mid-1970 and John M. Ivancevich and co-author of Michael T. Matteson's Organizational Behavior and Management. Later on, Conflict Analysis Method was gradually involved, such as graph theory, differential equation method, game theory, among which the game theory is the most widely used in the conflict analysis. In 1979, Professor Fraser and Hipel from Waterloo University of Canada improved the Strategy Analysis and thus formed F - H Analysis. Kilgour. D.M and W.Hipel finished the graph model for conflicts in 1987. In 1993, conflict management analysis and application of new theory of graphical model was introduced in the book Conflict models in graph form solution concepts and their interrelationship of three Canadian scholars, L.Fang, W.Hiple and D.Kilgou.

In China, the study of management conflict theory started late, relatively backward, but still achieved significant results. In the study of qualitative analysis, the organizational conflict management theory is studied in the Qiu Yizhong's Scholars both at Home and Abroad about Enterprise Organization Conflict Theory Research and Enterprise Organizational Conflict Management, Xu Xiaojun's State-owned Enterprise Sector Conflict Management Research, Li Danfu et al about the Problem of Conflict Management in Organization. In addition, Professor Xi Youmin studied the theory of conflict management from the perspective of harmonious management. In the study of quantitative aspects, Liu Hong's Economic Conflict Analysis Theory, Method and Application Research, Chen Xiaodong's Enterprise Conflict Mechanism Transactions, Zhang Guangxiong's Risk Conflict Analysis Model Research and Application and other papers studied the dynamic method of conflict analysis; Qu Xiaofei's Bargaining Game Theory Development added risk awareness to the Conflict Theory; Hu Ping's A Simple and Practical Method of Conflict Analysis divided the players in conflict into three types, and proposed a three-dimensional graphical representation. Applying to the F - H method, DE A, Game Theory and other theories and other cross-disciplinary, Wu Yuhua and his research team analyzed the theoretical system of conflict and cooperation, trying to establish a complete architecture of conflict and cooperation theory. Through qualitative and quantitative research, the Conflict Theory becomes more scientific and practical^[1].

2 Characteristics of Management Conflict Based on Markov Chain

Assuming observation of a group of by managers' conflict behavior, and that the observations are continuous, uninterrupted, i.e. having the historical follow-up investigations into the individual with conflict behavior, which regular phenomena would be found?

There is often a certain probability for the emergence of a certain behavior. Behavior of group conflicts, especially those with strong dominant features of the conflict behavior and confrontational

conflict behavior, most are beginning in the form of chance and randomness. Actually, the ordinary human behavior, when anyone under what conditions producing which kind of behavior, are random, uncertain. But this is not to say that human behavior is totally unpredictable. We can not use mechanical determinism to describe human behavior, but it can approximately treat human behavior as a random process. You can not accurately predict what will happen tomorrow, but you can roughly determine the probability of occurrence of certain things. In the enterprise, if workers are required to work at 8 am tomorrow, in general, the staff will work on time or ahead of schedule, but who can guarantee that some people will not suddenly fell ill, a car accident or other accidents? It can be seen, no matter what the behavior, even a high probability behavior, has been some degree of uncertainty. Management conflict behavior, as a special kind of human behavior, occurs less frequently and bears a certain risk for the personal interests of behavior undertakers. As a consequence, whether some people under certain circumstances will produce this behavior or not, relatively speaking, often with more causal factors.

We divide the management conflict behavior into implicit and explicit, confrontational and non-confrontational, certain types of individuals and groups and others. And we can make a more detailed classification according to different standards. For example, from the perspective of reason: some for economic interest, some for emotion and attitude of supervisors, some for job conditions and some for sympathy and solidarity toward others. From the patterns of manifestation, some acting public confrontation, some acting double face, some working lazily or slow down, some making faults and damaging equipment, some reducing the quality of products deliberately and some creates disturbances occasionally, and so forth. After dividing these different types and nature of management conflict behaviors, we review certain individual who has been many management conflict behaviors and register his management conflict behaviors one by one in accordance with the time sequence and uniform standards. We will find it is not strictly defined whether there will be a particular management conflict behavior in the following a certain management conflict behavior. But for some people, it is often with its own characteristics for there being a particular probability from the management conflict behavior after a management conflict behavior or some. And there seems to have some kind of the same or similar nature in between those before and after the successive behaviors^[2].

Since it is randomness and certain probability in the appearance of management conflict behavior, we have to treat certain management conflict behavior as a continuous series of statistical events in the study of management conflict behavior. That is to say, we not only study the probability of some of the behavior in the sequence but also study the probability of the behavior after a behavior, even to study the probability of behavior in front of it, which is Markov Process. Markov Process is a stochastic process with discrete under a class of continuous time-varying state. Its original model, Markov Chain was proposed by the Russian mathematician A.A.Markov in 1907. The process has the following characteristics: Under the current state of the known conditions, its future evolution does not depend on the evolution of its past. For example, the change of the number of animals in the forest can form a Markov Process. In the enterprise management process management conflict can be considered as Markov Process.

According to Markov process, the depth that an event is affected by a former one is usually expressed by the case before it as a condition to express the probability. There is transition probability in the conversion process of a state changing into another and this transition probability can be derived according to a state before, having no relation to the system's original state and the limited or unlimited times transfer before the transfer. A state transition process of the system forms a Markov Process and Markov Process in the whole series is called Markov Chain. Markov Chain may be continuous or discrete. Because the economic data are generally discrete, what we discussed below is discrete Markov Process, the first-order Markov Process. The order of Markov Process means the relationship between the previous states of the system when transferring to another state. If the state relates to the previous one, it is first order. If the state relates the previous two, it is the second-order. And so on, until the n-order. Therefore, if you only act on the individual with the management conflict as the study of history, the sequence of management conflict behavior generated by the management conflict, apparently, can be precisely expressed by a Markov Process. And the higher order can reflect the variation law of management conflict behavior^[3].

The basic concept of Markov Process is to study the state of the system as well as the transition of the state. State transition reflects the dynamic evolution of the system. The possibility of transition from one state to another state, we call the state transition probability. The arrangement of all the state transition probability is transition probability matrix. The state transition probability has two characteristics:

(1) $P_{ij} \geq 0$ means the probability of the shift from i-state to j-state; (2) $\sum_{j=1}^n P_{ij} = 1$

On Markov analysis, we assume that the number of system state remains the same in predictive period; system state transition probability matrix does not change over time; state transition is only affected by the previous state. Markov Chain is a mathematical model based on a random process.

3 Analysis of Management Conflict Based on Markov Chain Model

The application of Markov Chain needs to consider the basic differences of management conflict. In fact, there are a variety of reasons for the different conflict behaviors. The formation of management conflict behavior lies in not only psychological factors, such as divergence of interests, emotional differences and recognizing differences, but also human value, moral value, personal wisdom and conflict awareness. Judgments and conclusions of the unilateral factor do not necessarily reflect the actual situation, and the conclusion can hardly convince people. Considering the staff's original state, Markov Chain analysis method divides employees into the same level under the same standards, i.e. determining the state space, and then finding the step transition matrix, in the end, finding the ultimate vector according to the stability and ergodicity of Markov Chain, and judge and compare according to the ultimate vector. In the management conflict, the formation of many objects can be considered as a random process or approximate and the manager understands the value demand of management objects in the future, thus making application Markov Chain to the management conflict analysis [4].

Markov Chain application in the management of conflict is based on two observations. Then we construct the transfer matrix through a close observation of the staff's change of the two conflicts between different levels. Assuming that the management effectiveness is stable, the steady state distribution of Markov Chain can be used to express the ultimate state of the staff. Specific ideas are as follows:

In the process of quantifying the management conflict, we use Markov Chain to divide the original observations of an organization's staff to q levels according to the high, and then calculate the proportion of each level staff and the total and consider it as the state vector, with A said:

$$A = \begin{pmatrix} \frac{n_1}{n} & \frac{n_2}{n} & \dots & \frac{n_q}{n} \end{pmatrix}$$

n is the total number of employees in the chart, n^i is the i ($i = 1, 2, \dots, q$) number of levels.

Through several stages of observations, we analyze the change of each grades of employees. Again, divide the measured staff observations to q levels according to the high, then count the frequency of each level the number of stuff and calculate the transfer matrix P, following:

$$P = \begin{pmatrix} \frac{n_{11}}{n_1} & \frac{n_{12}}{n_1} & \dots & \frac{n_{1q}}{n_1} \\ \frac{n_{21}}{n_2} & \frac{n_{22}}{n_2} & \dots & \frac{n_{2q}}{n_2} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{n_{q1}}{n_q} & \frac{n_{q2}}{n_q} & \dots & \frac{n_{qq}}{n_q} \end{pmatrix} = (P^{ij})^{q \times q}$$

n^i is still t the i levels number of the first phase in the chart, n^{ij} is the number of i -level employees whose observations belong to the j -class employees after several stages, and meet:

$$\sum_{j=1}^q p_{ij} = 1, 0 \leq P^{ij} \leq 1, (i, j = 1, 2, \dots, q)$$

If we want to study multi-step ($k > 1$) transition probability $P^{(k)}$, we can use equations of Chamman-Kolmogorov that is:

$$P^{(k)} = P^{(k-1)} P_1 = \dots = [P_1]^k$$

When $k \sim \infty$, if the probability distribution of the state involved in the Markov Process is stability,

thus, we can obtain stability probability vector that will become the evaluation criteria, and then can get the specific quantitative indicators by solving the equations.

4 Conclusions

In the management practice, we use the Markov Chain to evaluate the management conflict. Generally we use the relation of the two successive value states (such as observing the two conflicts) to describe the transition probability matrix and can evaluate the object's practice of previous state. Markov Chain describes the process when k tends to infinity, the probability distribution of the states keeps constant, and at this moment we can use Markov Chain models to evaluate. Using the probability vector to solve equations, the feature of the vector root is assured artificially for 1, and then to establish evaluation standard. Whether each state achieves constant, the user validates by solving, but in the evaluation of management conflict, the valuator takes no account of the condition, and assuming that it achieves the stability state. In fact, the condition has a certain effect on constructing the stability probability distribution. We will farther discuss relevant improvement method.

References

- [1] Men Liping. Study Management Conflict by Classification[D]. Hebei Industry University, 2007: 9-11(In Chinese)
- [2] Liao Quanwen. The Conflict of Human Resources Management Practice[J]. China Human Resources Development, 2005, (5): 11(In Chinese)
- [3] Sun Hongli. Markov Model Application in the Prediction of the Enterprise Human Resources[J]. University of North China Electric Power Journal, 2004, (5): 8(In Chinese)
- [4] Chi Zhenming. The Study on the Sufficient Conditions of Markov Theorem[J]. Journal of Beijing Broadcasting Institute, 1999, (2): 6(In Chinese)