Research Article

Research on Conflict Behavior of Top Management Team in Family Enterprises: A Complex Network Perspective

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At present time, methods of research about top management team's conflict become more and more prosperous with the help of complex system theory and evolutionary game. Taking family enterprise as an example, this paper makes an attempt on exploring complex network modeling to study data processing method and abstraction method of complex network of TMT conflict. And the paper will consider the attribute and relational mapping of top management team as nodes and edges in complex network to discuss the direct correspondence between complex network structure and management team characteristics. Besides that, according to the multiple attribute decision making, the method to dig into core members of the top management team will be created on the basis of the degree, closeness, cluster coefficient, and betweenness. And then the article will devote to studying the impact of attributes to the inner mechanism of TMT conflict and team cohesion through the network characteristic analysis.

1. Introduction

In the era of knowledge-based economy society, as one of the decisive factor to get sustained viability and greater market development of family enterprises, conflict of top management team attracts more and more attention. Social investigation and mathematical statistics are usually adopted as basic tools in traditional research to discuss TMT (top management team) conflict and analyze the relationship between team performance and the motivation. In recent years, there is little progress in the description of nonlinear properties, microscopic mechanism, and interaction process of the TMT conflict. Different from the overall top-down research method, this paper tries to make use of grounded theory research method to describe attributes, microscopic behavior, and macrobehavior of TMT conflict with tools of complex network and multiagent complex system model. And finally the author will discuss the process and mechanism of team conflict and its influence on the cohesion and team performance from different perspectives.

2. Analysis on Static Network Characteristics of TMT Conflict in Family Enterprises

2.1. Network Relational Mapping of TMT in Family Enterprises. According to self-organization characteristics of family enterprises, TMT members' constitution has the characteristics of knowledge complementarities, special affiliation subordination, and specific properties of demography and task other than normal organization. As a result, the paper considers individual members in family enterprises as different network nodes. Furthermore, the relationship between member A and member B will be treated as the connection of nodes. On the basis of it, we can describe the relationship among team members with the help of network diagram. This paper will reveal the intrinsic link between team members' personal and relational information effectively and find out the effective mechanism of how the link influences the conflict through further analysis.

TMT members in family enterprise play important roles of conflict body in decision making and program

delivering. The network analysis and abstraction of conflict should be based on the attribute extraction of team members [1]. The attributes of key members that affect the conflict will be shown by a collection of $F = \{\text{age, education, relationship, role} \dots\} [2, 3]$; we can define $F = \{f_i \mid i \in N\}$. And various properties of team members f_i are listed by using enumeration. For example, $\{0, 1, 2, 3\}$ can be used to describe the relationship attributes of TMT members, and 0 means relationship is not so good, 1 means just ordinary, 2 means good, and 3 means relatives; similarly, when $\{0, 1, 2, 3\}$ is used to refer to education, it shows that 0 refers to primary education, 1 refers to high school education, 2 refers to college education, and 3 refers to graduate and doctoral education.

What a team should focus on are task and relationship. Thus, the internal conflict relationship among TMT members under the real conditions contains task conflict (TC) and relationship conflict (RC) [1, 4]. These two different relationship types can be shown by the finite set $\{\text{TC, RC}\}$, and their corresponding color set is $C = \{\text{red, green}\}$ which is denoted as $C = \{r, g\}$. In addition, by using a quad $G = (V, C, R, F)$, the paper will describe the relationship network of TMT members in detail.

$V = \{v_1, v_2, \dots, v_n\}$ suggests network node set. The elements of V shown by ordinal values $n \in N$ represent TMT members. And the value of set V determines the size of the team. In other words, more nodes means more complicated team relationships.

C refers to coloring schemes $\{r, g\}$ which are corresponding to relationships. The color of red means task conflict (TC) and green represents relationship conflict (RC).

$R = \{r_{ijc} \mid i, j \in N, i \neq j, c \in C\}$ is a set which refers to members relationship. The manifestation of task conflict (TC) in this set is color edge, that is, from member j to member i , which means j and i are connected. Meanwhile, the manifestation of relational conflict (RC) is bidirectional color edge between j and i , which represents interpersonal relationship of member i and member j .

F is the attribute value matrix for TMT members and its element f_{ij} means attribute values P_j of TMT member i .

Therefore, this network can be defined in the form of the adjacency matrix as formula (1) below:

$$A = \{a_{ij}\}_{N \times N} = \begin{cases} a_{ij} = s(i, j, r) \mathbf{r} + s(i, j, g) \mathbf{g}, & i \text{ connected with } j, \\ 0, & i, j \text{ is not connected.} \end{cases} \quad (1)$$

In formula (1), $s(i, j, c)$ indicates the number of color edges whose length is 1 and it means nodes i and j are connected. And colors r and g are coloring vectors. It is worth noting that $i, j \in n(V)$ and $c \in C$.

Due to the basic concept of graph theory [5, 6], the finite sequence $W_k = (v_0, v_1, v_2, \dots, v_n)$ is called the K th path from v_i to v_n . Therefore, we can count $W_{(i_0, i_k, c)} = (r_{i_0 i_1 c}, r_{i_1 i_2 c}, \dots, r_{i_{k-1} i_k c})$ as a path whose color is c from i_0 to i_k in the TMT relationship network. If each side and each node of path $W_{(i_0, i_k, c)}$ are all different, this path will be called Hamilton [7]. And the existence of $W_{(i, j, c)}$ in the network

means that nodes i and j have relationship with c color. The path with shortest length which connects i and j is noted as the shortest path $d(i, j, c)$.

2.2. The Analysis of Network Attributes of TMT in Family Enterprises. If we can promptly determine the key personnel who definitely influence cohesion of TMT and focus on how to deal with them it will be possible to reduce the potential conflicts and improve TMT efficiency [8]. Based on the accomplishment of complex network mapping of TMT, the paper chooses four properties indexes, which consist of degree, closeness, cluster coefficient, and betweenness, and tries to set up correlation between characteristics of TMT and specialty of complex networks. Finally, by analyzing these four properties, we can efficiently obtain nonlinear information and situation of TMT network and digest core information about TMT conflict effectively [9].

2.2.1. Network Attributes of Top Management Team

(1) *Degree.* Degrees can be defined as the numbers of edges connected to the node v_i , which are the basic characteristics of the network nodes. And, in this paper, the degree of TMT relational network can be seen as vector sum of different color edges associated with v_i . Consider

$$\mathbf{k}(i) = k(i, r) \mathbf{r} + k(i, g) \mathbf{g}. \quad (2)$$

In formula (2), we consider the numbers of different color edges which are connected with v_i as color C , and they will be calculated with the following formula:

$$k(i, c) = \sum_{j=0, i \neq j}^{n(V)} s(i, j, c), \quad c \in C = \{r, g\}. \quad (3)$$

With the help of adjacency matrix properties of N order simple undirected graph G , the main diagonal elements c_{ii} of matrix C ($C = A^2 = \{c_{ij}\}_{N \times N}$) can be expressed as

$$c_{ii} = \sum_{j=1}^N a_{ij} a_{ji} = \sum_{j=1}^N a_{ij}^2 = \sum_{j=1}^N a_{ij} = k_i. \quad (4)$$

We can know easily that c_{ii} is the degree of corresponding node v_i .

The importance of the node can be shown through the value of nodes degrees. In other words, the node with high degrees in the network means the member has a complex interpersonal relationship with others in the task and human communication. So these members should be skilled in the management experience, communication skills and technical level; otherwise lacking of all these skills might result in the task or interpersonal conflict easily [10]. So the node can be considered as the core reference characteristics of potential conflict in top management team.

(2) *Closeness.* We use closeness to measure the centric degree of nodes according to shortest path. And closeness refers to the reciprocal of the sum of all the shortest distances from

node v_i to others. If $d(v_i, v_j)$ are assumed to be the numbers of sides contained in the paths which started from point v_i and ended in the terminal point v_j , the closeness C_i of nodes v_i can be described as

$$C(v_i)^{-1} = \sum_{j=1}^n d(v_i, v_j). \quad (5)$$

Based on formula (5), the closeness of TMT network can be known as a vector which consisted of two kinds of colors. And the closeness C_{ic} of color C of node v_i can be shown by following formula:

$$C(i, c)^{-1} = \sum_{j=0}^{n(V)} d(i, j, c). \quad (6)$$

The central location of every node in the network depends on the differences of closeness. The larger closeness means more important position. Communication will be more smooth, task transfer will be more convenient, and the conflict will be reduced greatly when network distance becomes small in the task and interpersonal interaction among the TMT members. Therefore, if the closeness of a TMT member is large, he/she will be in the center of the network. His/her strong cohesive force can fully and effectively mobilize and utilize human resources of the team; thus it is beneficial to improve the efficiency of TMT in family enterprise [11, 12].

(3) *Cluster Coefficient*. The relevance characteristics of social capital network are obvious in some sense. For example, your two different acquaintances may also by coincidence be familiar with each other. This kind of network structure which is known as integration can be described as cluster coefficient quantitatively, and cluster coefficient means the connection probability two nodes which are all have connections with another node in the network. Correspondingly, the member with high cluster coefficient will have more complex business relationships and closer human relationships in TMT network. If $E_c(i)$ is assumed to be a collection of nodes which are connected with node v_i in TMT network, we have the ability to calculate the cluster coefficient of TMT network according to the definition of cluster coefficient:

$$CC(i, c) = \frac{\sum_{j \in E_c(i), d(i, j, c)=1} 2s(i, j, c)}{(E_c(i) + 1)}. \quad (7)$$

(4) *Betweenness*. Freeman (1977) [13, 14] proposed the concept of betweenness can be considered as global network characteristics. Usually, we use betweenness to identify and measure the effect and influence of nodes or edges in the network. Generally, the high value of betweenness of a member's node indicates that his/her interpersonal interaction channels are also relatively close. As a result, he/she can influence the team performance greatly. The betweenness B_i of a Node v_i can be defined as the number of the shortest paths which go through node v_i between all nonadjacent nodes v_j and v_k . Based on this definition, nodes' betweenness of color C network of TMT can be expressed as

$$B(i, c) = \sum_{j, k, j \neq k \neq i} N_{jk}(i, c). \quad (8)$$

It is important to note that N_{jk} shows the number of the shortest paths between v_i and v_j , and $N_{jk}(i, c)$ represents the number of the shortest paths with color C which go through node v_i .

2.2.2. *Data Processing of Characteristic Attributes*. Degree, closeness, cluster coefficient, and betweenness, four characteristic properties which are commonly used to describe TMT network, are usually observed and measured by value of different colors. And due to their vector characteristics, the author has to make further processing before analyzing the core nodes of network. In TMT network, we use ω_r and ω_g to show the weight of task conflict (conflict arising from task) and interpersonal conflict (conflict arising from personal relationship), respectively. The weight vector can be denoted as $\omega = (\omega_r, \omega_g)$. $\omega_r + \omega_g = 1$ will hold without thinking about other factors in the team work. When the family enterprise mainly pays attention to business strategic orientation and task management, the value of ω_r will be relatively higher; while the family enterprise focuses more on the interpersonal interactions and relationships, the value of ω_g usually will be relatively higher.

If pr is assumed as a particular attribute value of one company, we can obtain that $pr(i) = pr(i, r)\omega_r + pr(i, g)\omega_g$. On the basis of all the above, we can construct a matrix U , which consists of degree, closeness, cluster coefficient, and betweenness. And standardization is essential with the help of following formula because of different dimension of these attributes.

$$pr'(i) = \frac{pr(i) - \min(pr(i))}{\max(pr(i)) - \min(pr(i))}, \quad i \in n(V). \quad (9)$$

After calculation with formula (9), we are able to obtain matrix V which is standardized from matrix U . In addition, the canonical matrix also needs normalization processing to simplify calculation. Consider

$$pr''(i) = \frac{pr(i)}{\sum_{i=1}^{n(V)} pr(i)}. \quad (10)$$

Finally we can obtain the normalized matrix Y .

2.3. *The Method to Mine Core Nodes of TMT Relation Network in the Family Enterprise*. The team leadership which is a key factor to influence the team cohesion determines that the author should look for the core nodes of TMT network. System science [15] believed that the importance of network nodes is equivalent to its destructiveness, so we should observe how the node removal influences network connectivity based on system function. However, social network research [16] thought that the importance of the node is equivalent to its significance. So we should collect the effective information in the network under the condition of network connectivity to analyze the differences among the nodes so as to count and calculate the degree and betweenness of nodes and finally confirm quantitatively the importance of nodes in the network.

2.3.1. The Sequence of Node Weight. According to the definition and analysis of the degree, we could know that if you want to estimate the importance of a node, it is best to measure it from the perspective of global network. Besides, the value of the degree of adjacent nodes is equally important. It is assumed that N_i refers to a collection of nodes which are adjacent to node i , and w_{ij} can be seen as the weight between node i and its adjacent node j . It is easy to infer from these definitions that $w_{ij} = w_{ji} = (k_i k_j)^\theta$ in a simple undirected network. In this formula k_i is defined as the degree of node i , k_j means the degree of node j , and $0 \leq \theta \leq 1$ is a control parameter. Based on it, the node weight s_i of node i can be expressed as

$$s_i = \sum_{j \in N_i} (k_i k_j)^\theta. \quad (11)$$

If it is difficult to estimate the importance of the relationship between two nodes; we can assume the value of θ is 0. According to the degree of nodes it can be easy to calculate vertex weight. It is known to be S-node. The node weight of TMT network includes two dimensions which are work-related network and human network. Therefore, we are able to find out position features and importance of each node in different relational network.

2.3.2. The Sequence of Multiple Attribute Decision Making. Four properties which are degree, closeness, cluster coefficient, and betweenness can be used to elaborate the characteristics of the network nodes from different sides. So we can establish characteristic attribute value matrix U , standardization matrix V , and normalization matrix Y to evaluate the importance of TMT network node under complicated environment based on Multiple Attribute Group Decision Making Theory. Ordered weighted geometric (OWG) operator described as $R(v_1, v_2, v_3, v_4) = \sum_{j=1}^4 x_j^{w_j}$ will be used for collecting attributes. In this formula, x_j means j maximum element of a column's data in the matrix V , and $\omega = (\omega_1, \omega_2, \omega_3, \omega_4)^T$ refers to the index weighting vector which connects with R . In addition, what we need to note is the fact that $w_j \in [0, 1]$ and the value of $\sum_{j=1}^4 \omega_j$ is 1. So we can get ω :

$$\omega_{ij} = \frac{1}{\sum_{j=1}^4 \left[1 / \sum_{i=1}^{n(I)} 2(y_{ij} - 1)^2 \right]} \times \frac{1}{\sum_{i=1}^{n(I)} 2(y_{ij} - 1)^2}. \quad (12)$$

On the basis of all the above, four values of weight $\omega_1, \omega_2, \omega_3$, and ω_4 which will respect the degree, closeness, cluster coefficient, and betweenness, respectively, can be obtained. And we have ability to get an order in matrix Y according to the following formula:

$$\text{order}(i) = y_{i1}^{\omega_1} + y_{i2}^{\omega_2} + y_{i3}^{\omega_3} + y_{i4}^{\omega_4} \quad i \in n(V). \quad (13)$$

If we can obtain the order relationship with the help of formula (13), it will be easy to sort these network nodes and

find the position attributes of a node consisting of degree, closeness, cluster coefficient, and betweenness. Then, it is possible for us to find out key members of TMT, analyze the position of each member in the network, and explore the underlying cause of the conflict.

The members of Family Business's TMT have individual differences and their behavior is dynamic, while the individual members have the abilities of self-learning and self-adaption and are able to adjust their behavioral decision making based on their own experience and the interaction with the other members in the later work; thus, the conflict between team members is complex management problems; it has a nonlinear characteristic. This study pays attention to making a comparison between the different values of sequence calculated through node weight sorting and multiple attribute decision making sorting to identify and measure the position and role of the members in the team.

3. The Calculation Model and Experimental Analysis

3.1. The Model for Calculating. According to the definition of the attributes and operator algorithm, we can divide the calculation model into several steps. Firstly, draw TMT network graph and calculate characteristic attribute of two color vectors. Secondly, construct attribute value matrix by the weights of two colors (red and green); these two colors represent task conflict and relationship conflict, and also construct attribute value matrix by the weights of two colors. Thirdly, through normative approach and normalization processing, establish the standard matrix and the normalized matrix. Finally, count the value of weight and sort the attribute value, and precisely describe the key nodes [17, 18]. The calculation model to judge and look for the key node of top management team network is shown in Figure 1.

3.2. Background of E and F Enterprises. Two relatively big family enterprises which are included in mobile communication products distribution industry and produce mobile communication products are located in Yangtze River delta region. Due to typical attributes, they are chosen as examples in this paper. For the convenience of research, we refer to the sample enterprises as E enterprise and F enterprise. The method of comparative study of two case companies was adopted in this paper. In addition, we collect relevant materials and interview not only a manager who has worked in E and F companies successively, but also one present TMT member in each company, and to interview them both for three times. Semistructured interview method is used in these interviews. Under the guidance of the researchers, interviewees introduce in detail the background of the two companies, TMT members, personality and leadership style of CEO, and the specific operation process within TMT, such as internal communication, conflict, decision making, and the performance of the company [19]. From Table 1 we can make a comparison between two family enterprises.

Like many other private mobile phone enterprises, enterprise E develops rapidly at the beginning by selling smuggled

TABLE 1: Background description of *E* and *F* enterprises.

	<i>E</i>	<i>F</i>
Time of company's foundation	1996	1998
Corporation nature	Family business, restructured as large state-owned joint venture company in 2004, used to engage in mobile phone distribution, now operates as limited liability company	Family business, now operating as Co., Ltd.
Brand agency	First-line brand of mobile phones, such as Samsung, Motorola, and HTC	Second- and third-line brand of mobile phones, such as LG, Lenovo, ZTE, and Tianyu
Major markets	Concentrated in the Yangtze River Delta region, mainly in Jiangsu Province	Nationwide, especially focus on relatively small city in Zhejiang Province
Main business operation	Engage in mobile phone sales agent service and telecom service	Engage in China mobile business sales agent service, such as mobile phone sales agent, telecom service, and cross industry investment
Operating conditions	Performance is stable; sales of 3.1 billion yuan in 2007	Sales income is 3.4 billion yuan in 2007 and then losses due to the volatile market changes

FIGURE 1: Evaluation model of network attribute.

mobile phone and related telecom products. Enterprise *E* has focused its attention on distributing mobile phone through agents since 1996. Relying on diversified and longitudinal alliance strategy and close cooperation with the upstream entities, enterprise *E* has finally become a joint venture company of state-owned enterprises and builds up a relative-sound organizational structure in 2004. Enterprise *E* is a sales agent of the first-line mobile phones at present and takes the lead in the relevant field. Meanwhile, *F* enterprise mainly sells second- and third-line mobile phones. After its accumulation and expand as well as external cooperation with upstream resources, *F* enterprise has a larger market in the second- and third-tier cities by taking the advantage of traditional sales channels. Table 2 shows the two companies' TMT members and Table 3 illustrates the comparison of features between two enterprise TMT members.

Table 3 tells us that the TMT of *E* and *F* enterprises is all made up of the family members, senior staffs, and professional managers. In addition, the time point they founded is very near; that means these 2 enterprises have similar characteristics. However, the feature of 2 enterprises is different in the development scale, marketing, and management. For example, some key positions in *E* enterprise are held by professional managers, which ensure that they could efficiently play their role and work very well. And it can be implicated easily that the influence of family members on family enterprise has been weakened gradually.

Meanwhile, the assistant president of *F* enterprise tends to control and operate the company with centralized and standardized management. And the function and importance of the professional managers were overlooked, which resulted in high turnover rate. Thus, two cases in this paper have distinctive characteristics and are directly comparable.

The members of Family Business's TMT have individual differences and their behavior is dynamic, while the individual members have the abilities of self-learning and self-adaption and are able to adjust their behavioral decision making based on their own experience and the interaction with the other members in the later work; thus, the conflict between team members is complex management problems; it has a nonlinear characteristic. Compared to family enterprise *E*, enterprise *F* selects the beeline function style as organization structure, which takes the place of a complete governance structure such as board of directors and supervisory board. So the cohesiveness of the TMT is relatively poor. Though enterprise *F* introduced professional managers of different demography characteristics continuously, most of times they could not cooperate with family members and senior staffs in TMT very well. As a result, conflicts occurred among factions from time to time and often transfer from task conflict to relational conflict [20, 21]. In addition, the CEO, one of the most important members in top management team, is not able to deal with the TMT conflicts among different type's members very justly. As a result, it is difficult to attain a

TABLE 2: Comparative analysis on composition of TMT in *E* and *F* enterprises.

<i>E</i>			<i>F</i>		
Sequence	Position	ID	Sequence	Position	ID
01	President	Group accredited	01	President and general manager	Company founder & CEO
02	CEO	Company founder and administrative manager	02	Executive deputy general manager	Family member (in charge of finance, logistics management, personnel, etc.)
03	Assistant general manager	Professional manager	03	Assistant president	Professional manager
04	Deputy general manager	Professional manager	04	Administrative personnel manager	Professional manager
05	Finance director	Professional manager	05	Technical manager	Professional manager
06	Internal consultant	Family member	06	Sales manager	Professional manager
07	Marketing director	Senior staff	07	Financial department manager	Professional manager
08	Marketing manager	Senior staff	08	Finance director	Senior staff
09	Sales manager	Senior staff	09	Logistics department manager	Family member
10	Financial department manager	Senior staff			
11	Development manager	Senior staff			
12	IT manager	Senior staff			

TABLE 3: Comparative analyses on TMT attributes of *E* and *F* enterprises.

	<i>E</i>	<i>F</i>
Corporate governance structure	Relatively perfect and consists of the board of directors and supervisory board	Relatively lack of corporate governance, the board exists in name only, CEO also functions as president and general manager
Educational background	Internal consultant is a professional and well-known expert; assistant general manager, finance director, and marketing manager all obtained bachelor degree; and the educational background of other members in TMT is college or below	Assistant president and mobile department director all obtained bachelor degree; others' degree is college or below
Age range	They are all over 35 years old and less than 57; the average age is 44.2	They are all over 39 years old and less than 63; the average age is 48.1
Professional backgrounds	CEO majors in telecommunication specialty; financial director majors in accounting; professional managers all major in related specialty, and others have no relevant professional background	Finance director has previous related financial career background; professional managers have previous related career background; other executives in TMT have no relevant professional background
Presidency	Their terms are all long which are usually longer than 7 years; the active turnover of company veteran is low, especially core executives worked in the finance and sales department	Their terms are all short which are not longer than 5 years; the active turnover of company veteran and professional manager is high; for example, finance department manager and sales manager changed frequently

consensus; at the same time, the loyalty and cohesion of the enterprise continue to decline the team effectiveness and affect the team harmony [22–24].

It can be learned and founded from the interview that those members of TMT whose cohesiveness is strong often

make decisions by considering collective interests in the family enterprise *E*, although there are conflicts among teams in daily operating. And with the mechanism of regular meeting the members of the TMT can communicate with each other effectively. The CEO is reasonable and a good

FIGURE 2: Structure of TMT relationship network in corporate *E*. FIGURE 3: Structure of executive team relationship network in corporate *F*.

listener; on one hand, he can take the external professional managers' advice into account and strongly propagate and defend the company policy publicly; moreover, the CEO acts fairly to all employees and deals with the problem with them with all his efforts and makes the members of the TMT more engaged in their job in order to facilitate the reform.

3.3. Calculation and Analysis of the Case. Interview results show that members of TMT in *E* and *F* enterprises can be divided into two types such as working relationship and interpersonal relationship. The relation network of TMT in *E* and *F* enterprises can be presented in Figures 2 and 3. *r* color map is shown by solid lines, and the arrows in it refer to work point. *g* color map is drawn by dotted lines and the bidirectional arrows indicate strong interpersonal relationship. The working relationship in this paper comes from the case written in previous section and the network model is expressed using no-weight and undirected network.

The personnel composition in TMT is shown by the node in Figures 2 and 3 (it is described in detail in Table 2). And we use index method (*p*₁, *p*₂, *p*₃, *p*₄, *p*₅, and *p*₆) to

describe some basic properties *P* of the TMT members. They, respectively, stand for service life, education degree (1 means undergraduate and below, 2 means bachelor degree, 3 means master degree, and 4 means doctor degree), wages (A total of 1 to 10, the maximum is 10), the overall trust (value of self-evaluation, A total of 1 to 10, 10 is maximum level), the degree of cooperation (value of self-evaluation, A total of 1–10, the maximum is 10), and the communication level (value of self-evaluation, A total of 1–10, the maximum is 10). Based on attributes of all TMT members in *E* and *F* enterprises we can obtain attribute matrix *F_e* and *F_f*.

Different values of $\omega = (\omega_r, \omega_g)$ represent the diverse operation environment of the team. From Tables 4–7 we can know that when $\omega = (0.8, 0.2)$ means that the work of the team is on operation, the team's priority is to develop the business. Task conflict accounts for a large proportion on team conflict correspondently; on the other hand, when $\omega = (0.2, 0.8)$, the proportion of personal relationships in the team is bigger and the potential conflict is relationship conflict.

When task is in equilibrium with interpersonal relationship and $\omega = (0.5, 0.5)$, we can learn from decisive matrix

TABLE 4: Network attributes of TMT in E enterprise.

Name	Subsequence	F_e	Degree	Closeness	Cluster coefficient	Betweenness	S-node
WWY	01	(6, 3, 10, 9, 10, 10)	$2r + 3g$	$20r + 24g$	$1r + 0.6667g$	$0r + 0g$	$26r + 39g$
SHJ	02	(16, 2, 9, 10, 9, 10)	$8r + 8g$	$14r + 16g$	$0.0714r + 0.2500g$	$36r + 25g$	$112r + 184g$
ZQM	03	(9, 2, 6, 7, 8, 9)	$1r + 2g$	$27r + 25g$	$0r + 1g$	$0r + 0g$	$5r + 22g$
ZJ	04	(6, 3, 8, 10, 9, 9)	$4r + 2g$	$17r + 33g$	$0.20000r + 1g$	$36r + 0b$	$75r + 10g$
SZF	05	(4, 2, 6, 8, 8, 10)	$2r + 3g$	$26r + 24g$	$1r + 0.3333g$	$0r + 32b$	$14r + 24g$
WHC	06	(5, 4, 4, 7, 8, 8)	$2r + 2g$	$26r + 33g$	$1r + 1g$	$0r + 0g$	$14r + 10g$
DHY	07	(14, 2, 7, 9, 10, 9)	$2r + 3g$	$23r + 21g$	$1r + 0.6667g$	$0r + 0g$	$20r + 45g$
LXJ	08	(16, 1, 3, 9, 9, 10)	$2r + 3g$	$23r + 24g$	$1r + 0.6667g$	$0r + 0g$	$20r + 45g$
CHL	09	(10, 1, 3, 8, 8, 10)	$1r + 4g$	$24r + 20g$	$1r + 0.5g$	$0r + 5g$	$8r + 72g$
CB	10	(16, 1, 1, 8, 8, 9)	$1r + 3g$	$24r + 24g$	$0r + 0.6667g$	$0r + 0g$	$8r + 45g$
JHX	11	(10, 1, 2, 8, 9, 10)	$1r + 4g$	$24r + 18g$	$0r + 0.3333g$	$0r + 42g$	$8r + 72g$
LGF	12	(13, 1, 3, 7, 6, 8)	$1r + 1g$	$24r + 26g$	$0r + 0g$	$0r + 0g$	$8r + 8g$

TABLE 5: Relationship network attribute decision matrix and sequence $\omega = (0.5, 0.5)$ of TMT in E enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2.5	22	0.83	0	0.21	0.53	0.83	0	0.0724	0.1064	0.1187	0	1.6739
02	8	15	0.48	30.5	1	1	0.48	1	0.3447	0.2008	0.0687	0.3472	2.7142
03	1.5	26	0.50	0	0.07	0.27	0.50	0	0.0244	0.0542	0.0716	0	1.3918
04	3	30	0.60	18	0.29	0	0.60	0.59	0.0985	0	0.0858	0.2048	2.2356
05	2.5	25	0.67	16	0.21	0.33	0.67	0.52	0.0723	0.0663	0.0959	0.1806	2.2339
06	2	29.5	1	0	0.14	0.03	1	0	0.0492	0.0060	0.1431	0	1.3614
07	2.5	22	0.83	0	0.21	0.53	0.83	0	0.0723	0.1064	0.1187	0	1.6737
08	2.5	23.5	0.83	0	0.21	0.43	0.83	0	0.0723	0.0863	0.1187	0	1.6446
09	2.5	22	0.75	2.5	0.21	0.53	0.75	0.08	0.0723	0.1064	0.1073	0.0278	2.0708
10	2	24	0.33	0	0.14	0.40	0.33	0	0.0493	0.0804	0.0472	0	1.4666
11	2.5	21	0.17	21	0.21	0.60	0.17	0.69	0.0723	0.1205	0.0243	0.2396	2.2013
12	1	25	0	0	0	0.33	0	0	0	0.0663	0	0	0.5059

The value of weight of OWG is 0.2498, 0.2511, 0.2541, and 0.2477; the sequence is $02 > 04 > 05 > 11 > 09 > 01 > 07 > 08 > 10 > 03 > 06 > 12$.

TABLE 6: Relationship network attribute decision matrix and sequence $\omega = (0.2, 0.8)$ of TMT in E enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2.8	23.2	0.73	0	0.26	0.53	0.73	0	0.0765	0.0895	0.1056	0	1.6392
02	8	15.6	0.21	27.2	1	1	0.21	0.81	0.2940	0.1686	0.0305	0.2793	2.5211
03	1.8	25.4	0.80	0	0.11	0.39	0.80	0	0.0324	0.0658	0.1158	0	1.5103
04	2.4	29.8	0.84	7.2	0.20	0.11	0.84	0.21	0.0589	0.0185	0.1216	0.0724	2.3818
05	2.8	24.4	0.47	25.6	0.26	0.45	0.47	0.76	0.0765	0.0759	0.0680	0.2621	2.2758
06	2	31.6	1	0	0.14	0	1	0	0.0412	0	0.1447	0	1.0653
07	2.8	21.4	0.73	0	0.26	0.64	0.73	0	0.0765	0.1079	0.1056	0	1.6654
08	2.8	23.8	0.73	0	0.26	0.49	0.73	0	0.0765	0.0826	0.1056	0	1.6283
09	3.4	20.8	0.60	4	0.34	0.68	0.60	0.12	0.1000	0.1147	0.0868	0.0414	2.3818
10	2.6	24	0.53	0	0.23	0.48	0.53	0	0.0676	0.0809	0.0767	0	1.5656
11	3.4	19.2	0.27	33.6	0.34	0.78	0.27	1	0.1000	0.1315	0.0391	0.3448	2.3740
12	1	25.6	0	0	0	0.38	0	0	0	0.0641	0	0	0.5015

The value of weight of OWG is 0.2504, 0.2512, 0.2513, and 0.2471; the sequence is $02 > 04 = 09 > 11 > 05 > 07 > 01 > 08 > 10 > 03 > 06 > 12$.

TABLE 7: Relationship network attribute decision matrix and sequence $\omega = (0.8, 0.2)$ of TMT in E enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2.2	20.8	0.93	0	0.17	0.52	0.93	0	0.0691	0.1262	0.1446	0	1.7214
02	8	14.4	0.11	33.8	1	1	0.11	1	0.4065	0.2426	0.0171	0.4311	2.6703
03	1.2	26.6	0.20	0	0.03	0.06	0.20	0	0.0122	0.0146	0.0311	0	1.0951
04	3.6	20.2	0.36	28.8	0.37	0.55	0.36	0.85	0.1504	0.1335	0.0560	0.3664	3.0060
05	2.2	25.6	0.87	6.4	0.17	0.14	0.87	0.19	0.0691	0.0340	0.1353	0.0819	2.0836
06	2	27.4	1	0	0.14	0	1	0	0.0569	0	0.1555	0	1.1147
07	2.2	22.6	0.93	0	0.17	0.37	0.93	0	0.0691	0.0898	0.1446	0	1.6727
08	2.2	23.2	0.93	0	0.17	0.32	0.93	0	0.0691	0.0777	0.1446	0	1.6532
09	1.6	23.2	0.90	1	0.09	0.32	0.90	0.03	0.0366	0.0777	0.1401	0.0129	1.9149
10	1.4	24	0.13	0	0.06	0.26	0.13	0	0.0244	0.0631	0.0202	0	1.2687
11	1.6	22.8	0.07	8.4	0.09	0.35	0.07	0.25	0.0366	0.0850	0.0109	0.1077	1.8730
12	1	24.4	0	0	0	0.23	0	0	0	0.0558	0	0	0.4835

The value of weight of OWG is 0.2497, 0.2518, 0.2518, and 0.2467; the sequence is $04 > 02 > 05 > 09 > 11 > 01 > 07 > 08 > 10 > 06 > 03 > 12$.

U obtained from normalization of four attributes that the degree of node 02 is maximal (8.0) and the degree of node 12 is smallest (1.0); the proximity of node 04 is maximal (30.0) and the proximity of node 02 is smallest (15.0); the clustering coefficient of node 06 is maximal (1.00) and the clustering coefficient of node 12 is smallest (0.00); the betweenness of node 02 is maximal (30.5) and the betweenness of nodes 03, 06, 07, 08, and 12 is smallest (0). It is evident that node 02 gains advantage in a number of characteristics. We can get standard matrix V AND Y through commensurability and normalized processing of matrix U according to formula of (9) and (10). Then average weight value (0.2498, 0.2511, 0.2541, and 0.2498) can be calculated based on formula (11). Four attributes of executive team network will be collected to make use of the value, and the order relation is $12 < 06 < 03 < 10 < 08 < 07 < 01 < 09 < 11 < 05 < 04 < 02$.

When $\omega = (0.5, 0.5)$, $\omega = (0.2, 0.8)$, and $\omega = (0.8, 0.2)$ are used in the case, the order relation of attributes is as follows.

When $\omega = (0.5, 0.5)$,

order relation of attributes is $02 > 04 > 05 > 11 > 09 > 01 > 07 > 08 > 10 > 03 > 06 > 12$;

order relation of node weight is $02 > 04 > 09 > 11 > 01 > 07 > 08 > 10 > 05 > 03 > 06 > 12$.

When $\omega = (0.2, 0.8)$,

order relation of attributes is $02 > 04 > 09 > 11 > 05 > 07 > 01 > 08 > 10 > 03 > 06 > 12$;

order relation of node weight is $02 > 09 > 11 > 07 > 08 > 10 > 01 > 04 > 05 > 03 > 06 > 12$.

When $\omega = (0.8, 0.2)$,

order relation of attributes is $04 > 02 > 05 > 09 > 11 > 01 > 07 > 08 > 10 > 06 > 03 > 12$;

order relation of node weight is $02 > 04 > 01 > 07 > 08 > 09 > 11 > 05 > 10 > 06 > 03 > 12$.

It can be seen from Tables 5–7; Enterprise E finished a series of governance of internal structure and established

a perfect management system after the successful merger and acquisition with other entities. In addition, the introduction of professional managers (04, 05) is able to carry weight. For example, as a member of the professional managers (04), his business ability is strong in the perspective of the individual trait reflected by network attributes, despite the fact that he is from the “outsiders.” We can see that he is first in the condition of $\omega = (0.8, 0.2)$. And he is the second in $\omega = (0.2, 0.8)$, which means that he is good at dealing with others. At the same time, node weight order also suggests that he is critical in the team. All of these factors improve the efficiency of the senior management team. As the initiator of the company (02), he is the second under the condition of task direction $\omega = (0.8, 0.2)$, which is in balance with the true ability; however, the member is first under the general conflict $\omega = (0.5, 0.5)$ and the complicated interpersonal relationship $\omega = (0.2, 0.8)$, which is completely in compliance with the status of the company founder and shows that he has the prominent characteristics of cohesion.

From the perspective of continually changing work environment, when the value of $\omega = (\omega_r, \omega_g)$ is different, the core node (02) and (04) are still very stable whether they select node weight sorting or attributes sorting. At the same time, sequence of network structure of executive team in E enterprise is relatively stable under the different relationship orientation, which gives an explanation of the team’s strong ability to adapt to the conflict. As a result, it is helpful to provide strong guarantee for the effective operation of the team.

The algorithm for F is similar to foregoing E enterprise. The degree, closeness, cluster coefficient, and betweenness of TMT network in B enterprise are shown in Table 8. Characteristic attribute matrices U , V , and Y and sequence values under different tasks or relations orientation are shown in Tables 9–11.

Similarly, $\omega = (0.5, 0.5)$, $\omega = (0.2, 0.8)$, and $\omega = (0.8, 0.2)$ are used to calculate these attributes for E enterprise. The sequence of characteristic attributes of corporate executives under different condition is as follows:

TABLE 8: Relationship network characteristic attribute of TMT in F enterprise.

Name	Number	F_B	Degree	Proximity	Cluster coefficient	Betweenness	S-node
HWG	01	(14, 1, 10, 9, 9, 8)	$2r + 2g$	$14r + 20g$	$1r + 1g$	$0r + 0g$	$20 + 14$
ZTF	02	(9, 2, 9, 9, 8, 8)	$6r + 5g$	$10r + 14g$	$0.1333r + 0.3000g$	$16r + 17g$	$72 + 60$
SLR	03	(6, 2, 6, 6, 7, 7)	$1r + 2g$	$17r + 20g$	$0r + 1g$	$0r + 0g$	$6 + 21$
WZS	04	(4, 2, 7, 8, 8, 7)	$4r + 2g$	$12r + 22g$	$0.3333r + 0g$	$16r + 12b$	$48 + 6$
XJ	05	(2, 2, 3, 6, 6, 7)	$2r + 1g$	$18r + 29g$	$1r + 0g$	$0r + 0b$	$12 + 2$
XHJ	06	(5, 1, 5, 8, 8, 9)	$2r + 2g$	$18r + 17g$	$1r + 0g$	$0r + 22g$	$12 + 10$
CJZ	07	(4, 2, 2, 7, 8, 8)	$2r + 2g$	$16r + 20g$	$1r + 1g$	$0r + 0g$	$16 + 16$
LHF	08	(12, 1, 6, 8, 9, 8)	$2r + 3g$	$16r + 16g$	$1r + 0.6667g$	$0r + 1g$	$16 + 30$
HAP	09	(10, 1, 7, 7, 8, 8)	$1r + 3g$	$17r + 14g$	$0r + 0.3333g$	$0r + 26g$	$6 + 30$

TABLE 9: Relationship network attribute decision matrix and sequence $\omega = (0.5, 0.5)$ of TMT in F enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2	17	1	0	0.13	0.57	1	0	0.0605	0.0950	0.2464	0	1.7548
02	5.5	12	0.22	16.5	1	1	0.06	1	0.4650	0.1666	0.0148	0.2994	2.5516
03	10.5	18.5	0.50	0	0	0.43	0.40	0	0	0.0717	0.0985	0	1.0737
04	3	17	0.17	14	0.38	0.57	0	0.85	0.1767	0.0950	0	0.2545	1.9144
05	1.5	23.5	0.50	0	0	0	0.40	0	0	0	0.0985	0	0.5589
06	2	17.5	0.50	11	0.13	0.52	0.40	0.67	0.0605	0.0867	0.0985	0.2006	2.2679
07	2	18	1	0	0.13	0.48	1	0	0.0605	0.0800	0.2463	0	1.7313
08	2.5	16	0.83	0.5	0.25	0.65	0.80	0.03	0.1163	0.1083	0.1970	0.0090	2.1322
09	2	15.5	1.3	13	0.13	1.78	0	0.79	0.0605	0.2967	0	0.2365	1.9334

The value of weight of OWG is 0.2481, 0.2519, 0.2511, and 0.2489; the sequence is $02 > 06 > 08 > 09 > 04 > 01 > 07 > 03 > 05$.

TABLE 10: Relationship network attribute decision matrix and sequence $\omega = (0.2, 0.8)$ of TMT in F enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2	20.8	1	0	0.20	0	1	0	0.0714	0	0.2392	0	1.2157
02	5.2	13.2	0.27	16.8	1	1	0.09	0.81	0.3572	0.2330	0.0215	0.2440	2.5535
03	1.8	19.4	0.8	0	0.15	0.18	0.75	0	0.0536	0.0420	0.1795	0	1.5823
04	2.4	20	0.67	12.8	0.30	0.24	0.59	0.62	0.1071	0.0559	0.1411	0.1867	2.3281
05	1.2	15.2	0.2	0	0	0.74	0	0	0	0.1725	0	0	0.6430
06	2	17.2	0.2	17.6	0.20	0.47	0	0.85	0.0714	0.1096	0	0.2560	1.8034
07	2	19.2	1	0	0.20	0.21	1	0	0.0714	0.0490	0.2393	0	1.6844
08	2.8	16	0.73	0.8	0.40	0.63	0.66	0.04	0.1429	0.1469	0.1579	0.0120	2.1958
09	2.6	14.6	0.27	20.8	0.35	0.82	0.09	1	0.1250	0.1911	0.0215	0.3013	2.3791

The value of weight of OWG is 0.2502, 0.2513, 0.2502, and 0.2483; the sequence is $02 > 09 > 04 > 08 > 06 > 07 > 03 > 01 > 05$.

When $\omega = (0.5, 0.5)$, order relation of attributes is $02 > 06 > 08 > 09 > 04 > 01 > 07 > 03 > 05$ and order relation of node weight is $02 > 04 > 08 > 09 > 01 > 07 > 03 > 06 > 05$.

When $\omega = (0.2, 0.8)$, order relation of attributes is $02 > 09 > 04 > 08 > 06 > 07 > 03 > 01 > 05$ and order relation of node weight is $02 > 08 > 09 > 03 > 07 > 01 > 04 > 06 > 05$.

When $\omega = (0.8, 0.2)$, order relation of attributes is $04 > 02 > 06 > 09 > 08 > 01 > 07 > 05 > 03$ and order relation of node weight is $02 > 04 > 01 = 08 > 07 > 06 > 09 > 05 > 03$.

In the different value of $\omega = (\omega_r, \omega_g)$, traits of node 01 (CEO) ranks behind others in the network position and at the same time node 01 is excluded from key nodes. As the key leader of a team, node 01 has a poor performance in work instruction, interpersonal communication, and leadership. The chairman is unable to fulfill his duty, which will trigger conflict.

Viewing the situation as a whole, under different relationship status, the performance of professional managers (nodes 03, 05, 06, and 07) is just mediocre, except node 04. This company will lose its advantages. And the length of the path between general manager (node 01) and members (nodes 04,

TABLE 11: Relationship network attribute decision matrix and sequence $\omega = (0.8, 0.2)$ of TMT in F enterprise.

Number	U				V				Y				Order
	D	P	C	B	D	P	C	B	D	P	C	B	
01	2	15.2	1	0	0.17	0.53	1	0	0.0702	0.1345	0.1923	0	1.7787
02	5.8	10.8	0.17	16.2	1	1	0	1	0.4132	0.2538	0	0.3936	2.3045
03	1.2	17.6	0.20	0	0	0.28	0.04	0	0	0.0711	0.0077	0	0.8066
04	3.6	14	0.27	15.2	0.52	0.66	0.12	0.94	0.2150	0.1675	0.0231	0.3701	2.4885
05	1.8	20.2	0.80	0	0.13	0	0.76	0	0.0537	0	0.1462	0	1.0986
06	2	17.8	0.80	4.4	0.17	0.26	0.76	0.27	0.0702	0.0660	0.1462	0.1063	2.2110
07	2	16.8	1	0	0.17	0.36	1	0	0.0702	0.0914	0.1923	0	1.7228
08	2.2	16	0.93	0.2	0.22	0.45	0.92	0.01	0.0909	0.1142	0.1768	0.0040	2.0311
09	1.4	16.4	0.67	5.5	0.04	0.40	0.60	0.32	0.0165	0.1015	0.1154	0.1260	2.1015

The value of weight of OWG is 0.2491, 0.2523, 0.2520, and 0.2466; the sequence is $04 > 02 > 06 > 09 > 08 > 01 > 07 > 05 > 03$.

05, and 06) is long, which results in the lack of cohesion in the team and possible factional conflicts; meanwhile, the sequence of relation network of senior team members changes frequently. And the performance of members is poor to reduce team conflict, which leads to significant negative effects on team efficiency under the different relationship oriented.

Then we make a comparison between teams E and F of sequence changes of attributes and find that attribute order of members of top management team E keeps stable and it also keeps the strong ability to deal with conflict even under the relatively high level of conflicts. Besides, core members in TMT (nodes 02 and 04) have a great performance and play a key role no matter under what kinds of conflicts. Nevertheless, attribute order of members of team F is volatile under different level of conflicts. For example, node 02 as a vice general manager of family tends to be highly centralized and core members cannot be stable. As a result, the relationship among team is more complex. Besides, the conflicts among family members and external professional managers seriously damage the TMT's cohesion. Additionally, it can be found easily that the change of conflict intensity will exert a profound influence on the relationship between member i and j by researching static characteristics of network of the team under the different level of conflict. This relationship will reflect external smooth communication, polymerization degree between two nodes, the cohesion of core members, and obvious team characteristics.

4. Conclusions

Completely rational actor is inexistent in the real world; in addition to the fact that information between the TMT members of the family enterprise is not completely transparent, the personality characteristics and the emotion of the executing task also affect the learning and decision making process. The conflict between team members is complex management problems; it has a nonlinear characteristic. On the basis of research above, it is well founded to think that different conflict will influence the relationship between team members. In other words, it will bring changes about communication between members. And these changes will

affect the cohesion in TMT. At the same time, as a key factor, team leadership plays the significant role in the conflict. Results calculated with complex network model and results of interview are well corroborated mutually.

Firstly, only the manager who grasps the nature of team conflict comprehensively and who uses a variety of conflict management styles can deal with conflicts effectively and enhance the frequency of cooperation and improve team cohesion. Secondly, in order to maximize the overall interests of enterprises, enterprise managers should focus on strengthening unity and cooperation among team members, controlling the intensity of conflict between team members at a reasonable level, finding out primary causes of conflict, and clearing conflict of nature. Using different strategies of avoiding conflict can achieve contradictory unity between individual and team efficiency, effectively enhance cohesion of team, and build a harmonious team. Finally, these results show us that a fast and effective research program for the network study of conflicts in TMT under the complex environments will be provided if we analyze and extract the network characteristic attributes which are degree, closeness, cluster coefficient, and betweenness and aggregate the value of them with the help of the relevance between traits of management team and complex network characteristics on the basis of building the model of network [25–27].

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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