Extension Analysis of Employee Management Based on Social Network Model

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Abstract—**This paper establishes a social network model to analyze the correlation between employees and reduce the turnover rate in the application of the model. The model is combined with Extenics, which uses the matter-element" (physical existence), "affair-element" (events and actions) and "relation-element" to extend, analyzes and establish human resource basic element base. According to the algorithm of PageRank, and analyzing the loyalty of employees by the analytic hierarchy process (AHP), through the interconnection of Single-layer Network Model, a Multi - employee Social Network Model is constructed. Finally, it can find out that who maybe leave with high probability and influence. The model combines social network with Extenics, mines the inherent law of the loss of staff and the potential needs of employees, provides a basis for reducing the company's brain drain. In the future, the model can predict the employee's turnover in human resource management.**

Keywords—social network model; Extenics; HR basic element base; personal turnover rate

I. INTRODUCTION

The key to the success of the company is a group of well-trained talents. Therefore, to do this, companies need to do the best job to recruit the best people. Also, they need to retain the talents which they need to properly train and place talents in the right place, and eventually let the new person replace the person who leaves the company.

Companies need to be aware of employees' loyalty to the company in managing their human capital, build trust in their work, and manage the formation, dissolution, and maintenance of formal and informal relationships between people. When people leave jobs or retire, the phenomenon is called the organization's "chum." The company is located in a highly competitive market, so the management of human capital is a huge challenge.[1]

The company will face some problems: Generally problems include the following six aspects:[2]

1.The company aims to identify the dangers of "chum" at an early stage because it tends to keep employees loyal to their careers. If there is a risk of deterioration, from the beginning to improve the positive labor force of employees, rather than the late development of incentives to prevent people from leaving.

2.Employees may be affected by other "chum" former employees and start to "chum", so "chum" appears to be common in communication between employers and employees. Therefore, timely identification of potential "chum" is an effective and important means of management to prevent further "chum" incidents.

3.The problem of human resources is to arrange the staff into the most suitable positions, using their knowledge and skills to play to their greatest advantages. Currently, each employee receives an annual assessment based on his or her performance, which is usually determined by the leader of the immediate supervisor.

4.The company realizes that mid-level cadres (junior managers, experienced managers, and inexperienced executives) often feel there is no opportunity for advancement, and feel that jobs have reached bottlenecks, so if they find similar or better jobs, they are likely to resign. These mid-level positions tend to have high turnover rates (approximately double those of other posts) and need to be replenished all the time.

5.In order to upgrade to a higher position, employees need to accumulate years of specific job experience, which is an essential prerequisite for employee promotion and constitutes a major obstacle.

6.The company is concerned that employees are understaffed. Therefore some barely qualified and unqualified employees are recruited for probationary periods to reduce staff turnover, so that few employees are dismissed. But this has led to some low-level employees often in the company. The problem of staffing levels (low levels of some employees) has attracted the attention of management, but no one has provided a definitive solution yet.[4]

The rest of this paper is organized as follows. Section 2 discusses the basic theory of Extenics and constructs an human resource basic element base to generate creative ideas. Section 3 introduces the case study of the method, and builds a social network model which is suitable for the calculation of the employee turnover rate, and points out some future research areas.

## II. The Establishment of Character element[7,8]

According to Extenics, we can divide the description of things into three categories; that is physical, action, and relation. In order to visualize the description of physical, action and relation, we respectively set up the concept of "matter-element"(physical existence), "affair-element" (events and actions) and "relation-element". These are referred to as primitives. The primitives are expressed as triples of {objects, features, values}, which are logical cells of Extenics.[5]

As is known to all, each category has features and values. In the field of Extenics research, we can expand from objects, features and values, to conduct a comprehensive expansion.

The primitive theory uses "matter-element"(physical existence), "affair-element" (events and actions) and "relation-element" to describe the object of study, so the characters of all aspects of the property can be described from these three aspects described, and ultimately the human resource basic element base is established.[6]
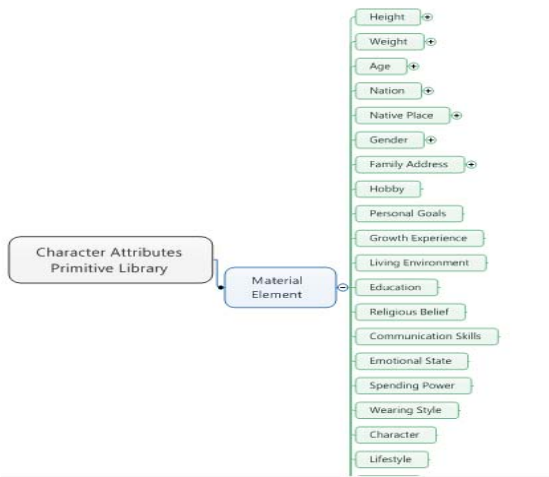
(a) All aspects of human nature
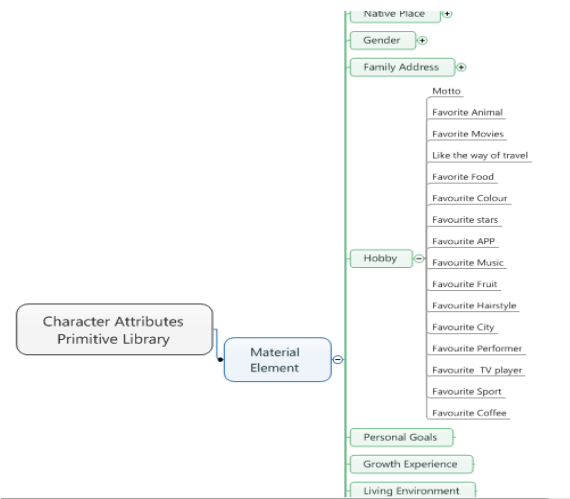
(b) Division of Hobby

Fig. 1.   Human resource basic element base.

III. Build up social network model -

In this paper, a model is based on the establishment of the human resource basic element base, which from the four major aspects of SPSS correlation analysis.

(1) Basic qualities, including education levels, seniority , academic structure , knowledge and health.

(2) Mental, including ideas, concepts, mental state, personality traits , work style and spirit of cooperation .

(3) Ability, including learning ability, adaptability, organizational skills, coordination, innovation and decision-making ability.

(4) The level of communication, including language, word level, communication skills and interpersonal skills.

We analyzed, press the four aspects of the evaluation that employees of various grades obtained in Table 1 using SPSS software.

TABLE I.   All aspects of the evaluation of employees(section)

	Senior_manager1	Senior_manager2	Senior_manager3	Senior_manager4	Senior_manager5	Senior_manager6	Senior_manager7	Senior_manager8	Senior_manager9	Senior_manager10
1	5	4	5	5	4	5	5	5	4	5
2	5	3	5	4	5	3	5	5	5	5
3	5	5	4	3	3	3	4	4	4	4
4	4	5	3	4	5	5	5	5	5	5

① The first line shows the basic qualities; ② second row indicates mental qualities; ③ Third row indicates ability; ④ The fourth line indicates the level of communication.

Then relationships are obtained by Ucinet software. We made the following conclusions according to different colors, the relationship between them and line segment between the numerical correlation between in the level of position obtains a class of employee relations in this way.
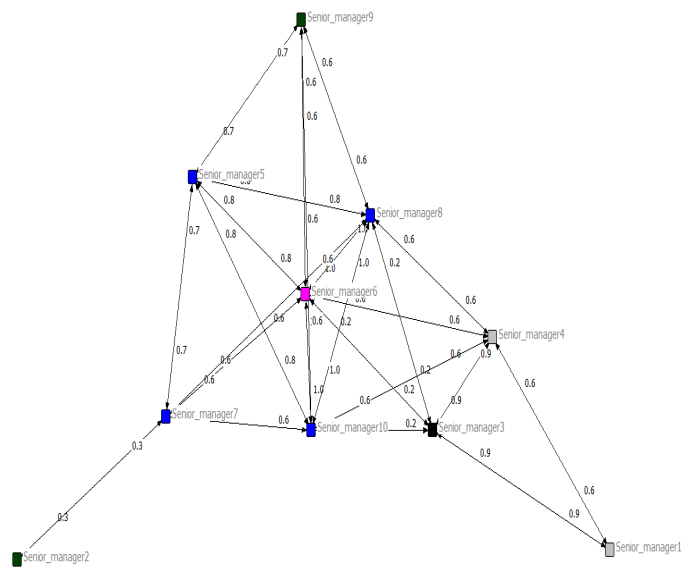

Fig. 2.   Correlation between employees.

In the method of using various types of employees and then sampling level, is extracted by the same method derived Fig. 3. The conclusion that such a network model.
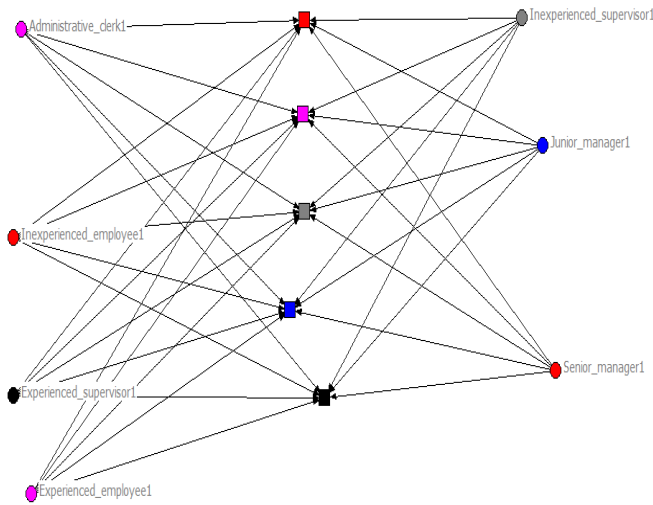

Fig. 3.   Seven Recruitment correlation between jobs.

As the saying goes, birds of a feather of lock together.

PageRank [3] core idea is the simple but effective point of view. By this thought, we can get an intuitive formula:

$$R(i) = \sum_{j \subset B(t)} R(j)$$

(1)

$R(x)$ is expressed as the PageRank of x, $B(x)$ is expressed as the people who point in the direction of x.

Type (1) means that a person's ability's strong and the weak equals to the sum of all its people's ability's.

When J have a number of different ability to friends (assuming the number N), the importance of each friend R (J)/N. So the formula (1) becomes:

$$R(i) = c \sum_{j \subset B(t)} \frac{R(j)}{N(j)}$$

C is a constant.

If workers are associated with other former employees who have chummed, they are more likely to chum. Therefore, the "chum" seems to spread from employees to employees, so identifying those who may be lost is valuable information to prevent further loss.

Due to this problem involves multiple levels of score calculation, so we choose to use the analytic hierarchy process to establish a mathematical model to analyze problems. First of all problem can be divided into three levels: the top as the goal layer, namely how to evaluate; The second layer as the criterion layer, criterion layer includes: salary, superior to the lower pressure, at the same level; the competition between the third layer for the plan, plan for each employee. Fig. 4 specific hierarchy chart is as follows:
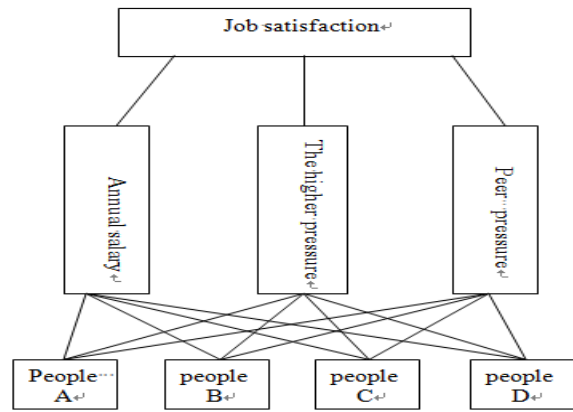

Fig. 4.   Analytic Hierarchy Process

For each paired comparison matrix, the maximum characteristic root and corresponding eigenvector calculated, using the consistency index of random consistency ratio index and the consistency check. If through the consistency check, after feature vector normalization is the weight vector; If not pass, reconstruct the paired comparison matrix.

We use the VISIO software to depict multi-level network node graphs, as shown in the Fig. below:
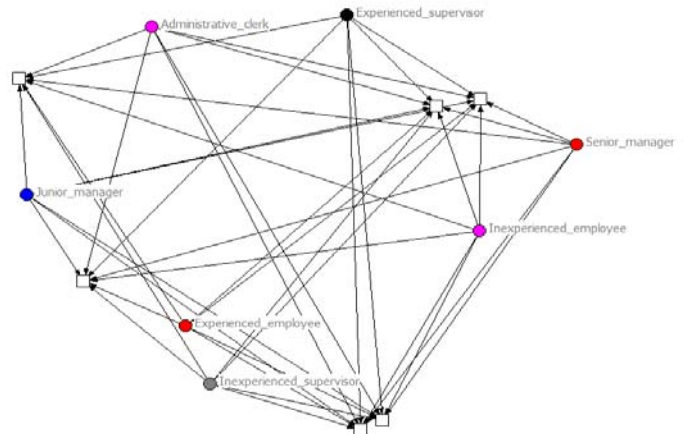

Fig. 5.   Kinds of multi-level network jobs.

The different color points in the graph represent people with different attributes, and the connection between the points indicates that they are related; the shorter the black line, the closer the relationship is between them.

IV.   CONCLUSION

Model thinks that scientific team is vital for the whole enterprise. Understand the need for support, all teams are extremely need a network system. In the company at the top, networking can include a decision-maker, such as a top executive; An influential person, his comments may be adopted by senior management; One or more operations, their

own work depends on how well team work; A commitment to people, for some reason, the company team work must pass a commitment for approval. Both inside and outside the company to expand networks, make team need support, able to work effectively.

The team was established on the basis of a multi-level network science. How to build an effective team, is based on the multi-level network model. It can help manager to choose which one is suitable for working together, who is not suitable for working together. This can be more intuitive, more effectively build team, improve work efficiency, bring to the company substantial profits.

At present, the research at home and abroad for the top management team characteristics mainly focused on the overall level, can be divided into a single or a few part of research. And, in the senior management team characteristics and firm performance or growth relations study, due to various factors, most will choose some single index to reflect the company's performance and growth, which can cause the information reflected by comprehensive specific enough.

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