

A Study on the Job Satisfaction of Employees based on Social Network Analysis

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Abstract. The correlation between the structural and positional factors of employees in the knowledge network and employees' job satisfaction and their personality traits was studied in the paper, in which a manufacture enterprise in Xi'an City is taken as an example. We found that employees' job satisfaction and their knowledge network centricity were positively associated; employees at the core position of the enterprises have a higher job satisfaction. In knowledge network, employees' performance and their knowledge network centricity are positively associated. Employees at the core position of the knowledge network have strong presentation and communication skills. Job satisfaction and employees' sociability, sense of responsibility are positively correlated, while their job satisfaction and their chance of taking risks are significantly negatively-correlated. When employees have a strong intention and ability of social communication, low intention of taking risks, strong sense of responsibility, they are likely to have a higher job satisfaction.

Introduction

Job satisfaction has long been regarded as an important issue by organizers and administrators in general. Researches on job satisfaction are numerous. Many studies at home and abroad have confirmed that job satisfaction has a significant effect on staff's job involvement, turnover intention, performance and other factors [1].

In this era of knowledge-driven economy, knowledge management of enterprises has become increasingly important. What's more, the role of knowledge network, formed by the knowledge transfer among employees within an organization, in knowledge management has become increasingly evident. Therefore, the running of knowledge network formed by employees within the enterprise and whether it affects employees' job satisfaction and job performance are issues needed to be valued.

Employees' personality traits are of great importance in their personal attributes. Although studies on employees' personality traits and their job performance have been a lot, they have not been taken seriously. And relevant researches in this area are fewer.

This study, from the view of knowledge network within an organization, studied the influence of employees' positions in the knowledge network and their personality traits on their job satisfaction to expand the analytical framework of the past theory of job satisfaction.

Social network theory

A social network is formed by a specific set of actors and their relationship. Each point and the contact among them constitute a "network structure", which has an important impact on actors' ideas and attitudes [2]. Social network analysis (Social Network Analysis, referred to as SNA) is developed to

analyze social structures and social relations. It mainly analyzes the relationship among actors to find the characteristics of their relationship and its effect on the organization [3].

Social network analysis, from the early sociometric measurement to today's matrix and plot analysis, from micro interpersonal networks to macro networks involved in social and economic life, has become one of the most concise and most persuasive methods to study social structure.

Social network analysis mainly focuses on the relationship among actors to study the properties of the whole network. Network centrality analysis, as a way to explain the association between the network and its participants, mainly evaluates the positions of actors in the network to get the centrality of a node, which determines the node's status and power size. Degree centrality, intermediate centrality and closeness centrality are the three main indicators in the centrality analysis of social networks. Degree centrality refers to the number of direct link of nodes; intermediate centrality refers to the lost connection of nodes when losing this node; closeness centrality refers to the distance among nodes. Social network analysis can get the centrality of each node by quantitative calculation as a basis for analysis.

Social network analysis provides tools to diagnose display and understand the relationships of people within an organization, and it has been applied to many administrative and academic issues. Krackhardt [4] divided employees' relations within the company into four different networks, namely, knowledge networks, emotional networks, intelligence networks and trust networks. Renzhi An [5], from the perspective of social network analysis, studied the networking and knowledge sharing of the enterprise.

Research Methods

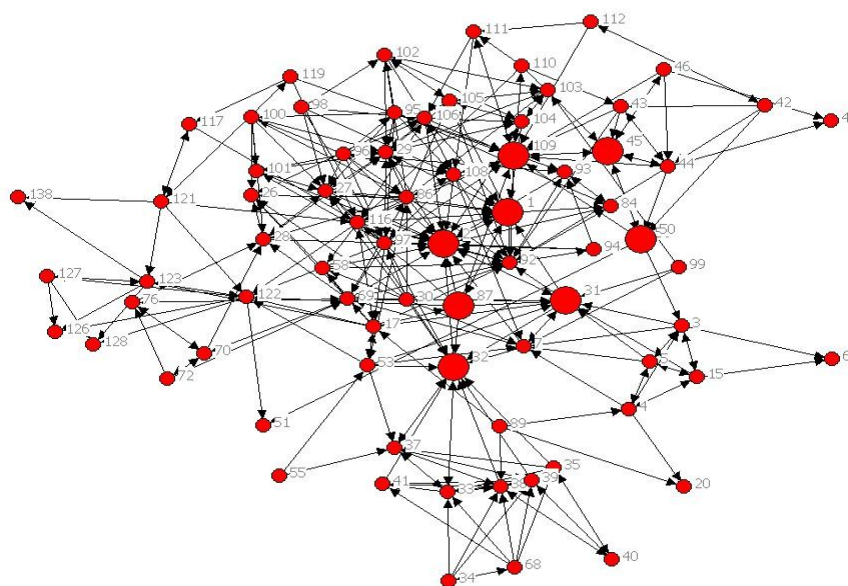


Fig. 1 Employees' Knowledge Network Topology Diagram

Network theory and network analysis are very powerful tools for organizational behavior research and enterprise relationship management. Relevant researches can not only help us understand the behavior of employees within the organization, but also can be applied to study and solve the practical problems faced by the enterprises.

Network analysis actually can be divided into three steps. First, to collect an enterprise, a department or a team's overall network data and draw them into a relationship network diagram, then, use network analysis software to do a quantitative indicators analysis to analyze each employee's position in the network structure, and finally, propose a solution and find an employee who is at the appropriate structural position to help companies solve the problem.

This case study used social network analysis to analyze the administration and supervision authorities of a manufacturing enterprise in Xi'an. The raw data were obtained through questionnaires, and employees' knowledge network topology diagram of the enterprise was obtained through Ucinet software,

shown in Figure 1, in which the bigger nodes represent employees who have higher degree centrality in the knowledge network. Employees' degree centrality in knowledge network was analyzed through topology diagram to obtain their structural and positional factors in knowledge network. And their job satisfaction and personality traits were acquired by satisfaction scale and the corresponding personality questionnaire.

Analysis Questionnaire of knowledge networks was built on topics such as "who do you often discuss issues with in your working". Employee satisfaction questionnaire used Likert seven degrees scale, from strongly disagree to strongly agree, 1 to 7 points were given orderly to each degree to conduct statistical analysis of job satisfaction. Personality traits questionnaire used "personality trait measurement table", which was divided into such seven dimensions to analyze employee's personality traits as activity, sociability, risk-taking, impulsivity, manifestation, rationality and responsibility.

Research hypothesis

The relationship between employees' network position in knowledge network and their job satisfaction

Employees, who have higher centrality in knowledge network, are often asked about the recommendations of work by others; they are usually authorities of knowledge or have more power in the formal field domain.

How can an employee's position in the network affect his or her job satisfaction? From many studies of organizational behavior from the past, you can find much literature about the influence of interaction between staff on their attitudes and performance on the job. And in the investigation of human networks, Ibarra & Andrews's [6] study results showed that there were many associations between staff's knowledge network centrality and their autonomy. People with higher job autonomy will have a higher sense of satisfaction, so the center position of the knowledge network will indirectly improve job satisfaction. These studies have given some analysis on this issue, but as Alder and Kwon [7] said, there were still not many organizational behavior researches based on an analysis of network structure. Therefore, this study, based on staff's different structure positions in knowledge network, explained the relationship between job satisfaction and relation network structure.

Two types of structural position are the common subjects of social network analysis, one is the central role of the network, the other is the intermediary position [8]. Krackhardt and Hanson's [9] study indicated that employees' professional capability and experience can be observed by the centrality of being consulted, and their ability of getting resources or information from others also can be observed by their tendency of joint consultation with others. As a result, Krackhardt's research pointed out that observation of knowledge networks can help identify members with high prestige or members with institutional power in the routine operation of the organization [14]. These members, mastering the most information and knowledge of the organizations, were consulted mostly by others. They were also the core employees in the knowledge network. According to the reference framework of Smith and some other researchers [10] applied in job satisfaction, this study, firstly is to explore whether an employee can have higher job satisfaction because of their higher centrality in the knowledge network, that is, those employees, with more knowledge authority or institutional power, can have high job satisfaction because of their mastering of knowledge and information. According to the theoretical literature, following assumptions were made:

H1: the central figure in the knowledge network, those who have higher degree of centrality in knowledge network, will have higher job satisfaction.

Relationship among staff personality traits, knowledge network position and job satisfaction

The personality questionnaire in this paper covers seven aspects, including activity, sociability, risk-taking, impulsivity, manifestation, rationality and responsibility. The points of the seven aspects represent different character intervals.

Previous studies have focused on the relationship between personality traits and job satisfaction, few researches focused on personality traits and network positions have been done.

Timothy [11] and others have analyzed 334-related data of personality and job satisfaction in 163 independent samples since 2000, the results related to job satisfaction are: neuroticism is -0.29, extraversion is 0.25, sense of responsibility is 0.26, Agreeableness is 0.17, openness is 0.02. Extraversion and sense of responsibility are significantly positively related to job satisfaction, while neuroticism is significantly negatively related to job satisfaction.

Piers [12] and others studied the relationship between "Big Five" and happiness. The results showed that neuroticism (N-) and well-being (SWB, self well-being) were significantly negative related, extraversion and happiness were significantly positive related, other factors were not significantly related to well-being. In other words, neuroticism and extraversion is closely related with the functions of life.

People tending to be neurotic experience negative life events easily, but extroverted people tend to experience positive emotions (Costa and McCrae, 1992) [13], and positive emotions are likely to extend to job satisfaction, which has been confirmed by meta-analysis of Connolly and Viswesvaran (2000) [14] ---- the relationship between positive emotions and job satisfaction. Facts also show that extroverted people have more friends than introverted people, they spend more time in social gathering. And because of their strong social skills, they may more greatly feel that social interaction (at work too) will bring more returns.

Organ and Lingl (1995) [15] approve that sense of responsibility should be associated with job satisfaction, because sense of responsibility represent a general tendency of work involvement, which provides more possibilities for the acquisition of satisfied job return, including formal (eg, wages, upgrade), and informal rewards (eg, recognition, respect, and personal accomplishment). Indirectly, literature about subjective well-being also shows that sense of responsibility job satisfaction have positive relationship.

The seven aspects of personality traits and employees' job satisfaction research hypotheses are as follows:

H2: people with higher activity, whose activity scores were higher, have higher job satisfaction.

H3: people with higher sociability, whose sociability scores were higher, have higher job satisfaction.

H4: people with less risk-taking, whose risk-taking scores were lower, have higher job satisfaction.

H5: people with less impulsivity, whose impulsivity scores were lower, have higher job satisfaction.

H6: people with less manifestation, whose manifestation scores were lower, have higher job satisfaction.

H7: people with higher rationality, whose rationality scores were higher, have higher job satisfaction.

H8: people with higher sense of responsibility, whose sense of responsibility scores were higher, have higher job satisfaction.

Based on previous literature, and the hypothesis that degree centrality in knowledge network has a positive relation with job satisfaction, assumptions about degree centrality in knowledge network and employees' personality traits are as following:

H9: people with higher degree of centrality in knowledge network, have higher activity.

H10: people with higher degree of centrality in knowledge network, have higher sociability.

H11: people with higher degree of centrality in knowledge network, have less risk-taking.

H12: people with higher degree of centrality in knowledge network, have less impulsivity.

H13: people with higher degree of centrality in knowledge network, have less manifestation.

H14: people with higher degree of centrality in knowledge network, have higher rationality.

H15: people with higher degree of centrality in knowledge network, have higher sense of responsibility.

Conclusions and analysis

In this study, centrality refers to employees' degree of centrality in knowledge network, that is, employees' in-degree value in knowledge network. Degrees of satisfaction were obtained overall satisfaction value through questionnaires. Staff personality traits were divided into seven dimensions shown in Table 1.

After verification of the above research hypothesis, we got the PERSON correlation coefficients of the variables in Table 1 as follows.

Table 1 related variables of the degree centrality in knowledge network

	centricity	activity	sociability	risk-taking	impulsivity	manifestation	rationality	responsibility	satisfaction
centricity	1.000								
activity	-0.123	1.000							
sociability	0.316	0.388	1.000						
risk-taking	-0.279	0.392	-0.050	1.000					
impulsivity	0.004	-0.318	0.076	-0.048	1.000				
manifestation	0.583**	-0.004	0.495**	-0.109	-0.056	1.000			
rationality	0.072	0.530**	0.212	-0.003	-0.263	0.152	1.000		
responsibility	0.138	0.239	0.196	-0.505**	-0.004	-0.163	0.495**	1.000	
satisfaction	0.623***	0.080	0.418**	-0.560**	0.082	0.353	0.332	0.466*	1.000

Note: * indicates a significant level of <0.1 ; ** indicates a significant level <0.05 ; *** indicates a significant level <0.01

Through an analysis of the results obtained by Table 1, following results can be got:

Being consistent with previous research, the correlation coefficient value of employees' degree centrality in knowledge network and their job satisfaction degree was 0.623, they were positively related, which means those who have higher degree of centrality in knowledge network have higher job satisfaction. People with higher centrality in knowledge network, who are the core employees and have more knowledge authority or institutional power, can have high job satisfaction because of their mastering of knowledge and information.

In the research of seven aspects of personality traits and employees' job satisfaction, results being consistent with the hypotheses were: activity and job satisfaction were positively related with a correlation coefficient 0.08; sociability and job satisfaction were significantly positively related with a correlation coefficient 0.418; risk-taking and job satisfaction were significantly negatively related with a correlation coefficient -0.560. Rationality and job satisfaction had a positive relation, the correlation coefficient was 0.332; sense of responsibility and job satisfaction had a significant positive relation, the correlation coefficient was 0.466. Results being inconsistent with the hypotheses were: Impulsivity and job satisfaction were positively related, the correlation coefficient was 0.082; manifestation and job satisfaction was positively related with a correlation coefficient 0.363.

The results show that the sociability, risk-taking, responsibility in the personality traits of employees have a significant effect on employees' job satisfaction, that is to say, if an employee has stronger social desire and ability, lower risk-taking, stronger sense of responsibility, then he or she is likely to have higher job satisfaction. The relationship between other four aspects of personality traits and job satisfaction do not reach significant level, meaning that they don't have significant effect on staff's satisfaction.

In the research of personality traits and employees' degree centrality in knowledge network, results which were consistent with the hypotheses were: sociability and knowledge network centrality were positively related with a correlation coefficient 0.316; risk-taking and knowledge network centrality were negatively related with a correlation coefficient -0.279; rationality and knowledge network centrality were positively related with a correlation coefficient 0.072; sense of responsibility and knowledge of network centrality were positively related with a correlation coefficient of 0.318. And results which were inconsistent with the hypotheses were: activity and knowledge network centrality were negatively related with a correlation coefficient -0.123; impulsivity and knowledge network centrality were positively related with a correlation coefficient 0.004; manifestation and knowledge network centrality were significantly positively related with a correlation coefficient of 0.583.

The results show that the employees' manifestation of personality traits has a significant effect on their centrality in knowledge network, which means that if an employee is more sympathetic, sentimental and

more willing to show his or her emotions, and he or she has stronger performance capabilities and communication skills, then it is likely that the employee is at the central position in the enterprise's knowledge network. The relationship between other six personality traits and knowledge network centrality does not reach significant level, that is, they have no significant effect on employees' centrality in knowledge network.

Summary and Outlook

This paper abstracted the advisory relationship of employees in the work into knowledge networks of enterprise's employees, and through questionnaires connected staff's job satisfaction, employee personality traits and position in knowledge network together to analyze their relationships, findings were as follows:

In knowledge network, employees' manifestation was significantly positively related with their positions in the network. Employees' positional factors in the network, their personality traits and social responsibility were all significantly positively related with their job satisfaction, while risk-taking had a significant negative relation with their job satisfaction.

Since the questionnaire was done just in one enterprise, the result has its limitations, the number of individuals will be expanded in future research. In addition, this paper only studied knowledge network, other issues such as friendship network, trust network, and other employee relations need further proof.

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References

- [1] Luo Jiade, Zhu Qingzhong. Influence of Interpersonal network structure factors on work satisfaction. *Zhongshan Management Review*, 2004, 12 (4): 795 ~ 823.
- [2] Liu Jun. Introduction of social network analysis, Beijing: Social Sciences Academic Press, 2004
- [3] Luo Jiade. Social network analysis notes, Beijing: Social Sciences Academic Press, 2005.
- [4] Krackhardt, David and Martin Kilduff. Friendship patterns and culture: the control of organizational diversity. *American Anthropologist*, 1990, Vol. 92: 142-154.
- [5] Renzhi An, Bi-ling. Network Relations and knowledge-sharing: analysis from social network perspective. *Information Science*, 2007.1: 75 78.
- [6] Ibarra, Herminia; Andrews, Steven B. Power, social influence, and sense making: Effects of network centrality and proximity on employee perceptions. *Administrative Science Quarterly*, 1993 38(2): 277-304.
- [7] Adler, Paul S. & Kwon, Seok-Woo. Social capital: Prospects for a new concept. *The Academy of Management Review*, 2002, 27(1): 17-40.
- [8] Wasserman, Stanley & Katherine Faust. *Social Network Analysis: Methods and Applications*. Cambridge: Cambridge University Press. 1994.
- [9] Krackhardt, David and Jeffrey R. Hanson. Informal networks: the company behind the chart. *Harvard Business Review*, 1993, July-Aug: 104-111.
- [10] Simth, P.C., Kendall, L.M., & Hulin, C.L. *The Measurement of Satisfaction in Work & Retirement*. Chicago: Rand McNally. 1969.

- [11]Timothy A. Judge Daniel Heller,Michael K. Mount. Five-Factor Model of Personality and Job Satisfaction: A Meta-Analysis. *Journal of Applied Psychology*, 2002, 87, (3): 530-541.
- [12]Piers S, Denis S O. Personality and happiness: a national level analysis. *Journal of Personality and Social Psychology*, 2002, 83(3): 767-781.
- [13]Costa, P. T., Jr., & McCrae, R. R.. .Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor (NEO-FFI) Inventory professional manual. Odessa, FL: PAR. 1992.
- [14]Connolly J J, Viswesvaran C. The Role of Affectivity in Job Satisfaction: A Meta-Analysis. *Personality and Individual Differences*,2000, 29: 265-281.
- [15]Organ, D. W., & Lingl, A. Personality, satisfaction, and organizational citizenship behavior. *Journal of Social Psychology*, 1995, 135: 339-350.