Incentives research of knowledge workers in small and medium high-tech enterprises

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Abstract-With the continuous development of China's small and medium enterprises, a lot of knowledge workers chose to leave each year because of lack of motivation, and caused huge losses to the enterprise. There are few studies of incentive mechanism model of knowledge workers combining with the characteristics of small and medium enterprises in present years. In view of this, the article first Sorted out literature and achievements of foreign relevant knowledge workers motivation, and made the 501 knowledge workers in Beijing, Shanghai, Ningbo city of small and medium high-tech. companies as the research object to survey the most important incentive factors, the incentive factors sensitivity and incentive degrees of knowledge workers. In the conclusion the most important motivational factors were: salary, job promotion, team work, management system, quality of leadership, the prospects of the company, the interpersonal relationship; and the incentive factors of knowledge workers are divided into three categories: management system incentive factors, job incentive factors and cultural incentives factors. The actual sensitivity and incentive degrees are significantly positive correlation.

Key words:* small and medium enterprises; high-tech companies; knowledge workers; incentive factors

I. INTRODUCTION

How to maximize the incentive of high-tech enterprise knowledge workers to enhance their competitive advantage from the content-type incentive theory evolution path [1], initially on Maslow's hierarchy of needs (in the 1950s) [2], McClelland's need for achievement theory (1950s), followed by Herzberg's two-factor theory (the late 1950s), then Alderfer's "ERG" theory (1969) [3].

Among the many high-tech companies, mostly small and medium enterprises, which are growing rapidly, flexible mechanism, are playing an increasingly important role, becoming a force for technological progress, economic growth, strong propulsion, and after playing the advantage leaps and bounds important force [4].

Small and medium sized high-tech companies have their own advantages and characteristics, but also has its deficiencies, it must be based on their own circumstances, learn from other successful business incentives, the use of scientific theory and a wealth of research results to develop for their own incentives in order to solve problems hinder the development of enterprises, in order to better retain employees, motivate employees, and thus in the fierce competition in the market [5-6].

From previous studies on incentives for small and medium high-tech enterprise knowledge workers can be seen [7~10], although the domestic scholars incentives for small and medium high-tech enterprise knowledge workers are discussed [11~13], but did not give the actual perception of and being the degree of relationship between motivation Moreover due to the limitations of sample size, there is no incentive for the factor analysis and regression analysis, while the extent of the impact is excited (the dependent variable) background information (control variables) also did not discuss in depth, So you want to be more scientific in-depth grasp of small and medium high-tech enterprises in recent years, knowledge-based incentives of employees, it is necessary to expand the sample size, the second is more motivating factor derived from the classical theory of starting, quantitative analysis of knowledge workers Sort the relationship between incentives and the actual perception of the importance of incentives and motivation level of the current, third is to combine the above analysis and theoretical support for the model derived incentives for knowledge workers and given the current status of enterprise management recommendations.

II. RESEARCH METHODS

A. Questionnaire Design

This paper intends to take on small and medium high-tech enterprise knowledge workers to investigate three areas, the first of its various incentives importance of investigation to determine which of the many incentives needs are the most valued employees, and which demand is secondary position. Secondly, small and medium sized technology enterprises knowledge workers actually feel the extent of these incentives were investigated to determine the enterprise in terms of incentives to do those still lacking, there is no incentive to achieve the desired level of incentives for businesses to quickly find the side of focus on improving the level of incentives provided for reference. Third, the degree of knowledge workers are excited to investigate the extent of being excited (the dependent variable) is relatively large, as well as background information (control variables) to be energized degree (the dependent variable) is what incentives (independent variables) identified significant impact. According to the research purpose, the paper design knowledge workers motivating factor questionnaire is divided into four sections: background information, the importance of incentives Scale, Scale and incentives actually feel and degree scale [14], all scales are based on defining the scope of this study, the reference to the domestic and foreign

scholars have used mature scale establishment. Various scales are 5-point Likert scale.

B. Select samples

This study focused on Beijing, Shanghai, Ningbo, three local small and medium high-tech enterprise knowledge workers for the study, including the production staff, technicians and management personnel, investigation time was in June to October 2013, using random sample. The 600 questionnaires were returned 586 questionnaires, of which 564 valid questionnaires (501 knowledge workers, 63 non-knowledge workers to comparator), and the effective response rate was 83%.

III. RESULTS

In this study, using SPSS 19.0 statistical package for social science survey data [15], the main statistical analysis methods include descriptive statistical analysis, factor analysis, correlation analysis and ANOVA analysis.

A.A variety of specific incentives descriptive statistics

For the questionnaire 22 motivators, 564 employees have opted out of the most important motivating factor, this factor will be the number of statistics, you can get knowledge workers and knowledge workers considered non most important motivating factor sorting (Table1) .By 22 the importance of incentives to conduct descriptive statistics scoring draw knowledge workers and non-knowledge workers before scoring six motivational factors specific score (Table2).

Table I. *Sort* important motivating factor

No	Knowledge workers				Non-knowledge workers			
	Factor	Sample Total	Select No	P(%)	Factor	Sample Total	Select No	P(%)
1	Salaries benefits	501	118	23.6	Salaries& benefits	63	10	16.5
2	Job promotion	501	57	11.4	Personal life	63	9	13.8
3	Company outlook	501	56	11.2	Training &learning	63	9	13.8
4	Management System	501	56	11.2	Management System	63	7	11.6
5	Training& learning	501	37	7.4	Leadership qualities	63	6	9.2
6	Leadership qualities	501	30	6.0	Teamwork	63	5	8.3

Table II. Score the importance of incentives （Before six）

No	Knowledge workers			Non-knowledge workers		
	Factor	Mean	SD	Factor	Mean	SD
1	Salaries &benefits	4.45	0.72	Salaries& benefits	4.65	0.65
2	Job promotion	4.40	0.72	Relationships	4.57	0.59
3	Teamwork	4.32	0.74	Leadership qualities	4.57	0.64
4	Management System	4.25	0.77	Company outlook	4.57	0.67
5	Leadership qualities	4.23	0.78	Teamwork	4.56	0.53
6	Company outlook	4.18	0.85	Personal life	4.54	0.79

From the table 1 and 2 , knowledge workers and job promotion prospects that the company is more important than knowledge workers believe that personal life is more important , see, knowledge workers more attention to the company's future prospects and job promotion .

B. The reliability of the questionnaire, validity and factor analysis

In this paper, the structure of factor analysis to verify the validity of the questionnaire on knowledge workers feel real motivating factor Scale factor analysis, KMO value is 0.90, Bartlett's test of p values<0.001, indicating suitable for factor analysis, the results get three factors explained 55.8% of the total variance, it is considered that the scale has good construct validity.

Table III. Knowledge workers motivators actual feelings questionnaire factor analysis

F	Factor	Loading factor F1	F2	F3	α
	Job promotion	0.659			
	the ability to play	0.643			
	Training	0.628			
	Involved in the management	0.626			
	Working Challenges	0.581			
	Working conditions	0.574			
F1	Management System	0.567			0.848
	Personal life	0.556			
	Working independently	0.554			
	Leadership qualities	0.541			
	Salaries and benefits	0.527			
	Job security	0.438			
	Work responsibilities	0.386			
	Working interest		0.916		
	Working competency		0.908		
F2					0.937
	Fitness		0.857		
	Achievements		0.817		
	Work recognized		0.802		
	Relationships			0.936	
F3	Company outlook			0.931	0.953
	Teamwork			0.930	

Note: The value of the F value is less than 0.3 does not show

This paper used Cronbach α coefficient [16] to test scale.α coefficient of the three factors obtained here were 0.848,0.937,0.953 reached (Table 3). This shows a high degree of consistency and a good measure of the internal structure of the questionnaire showed high reliability.

In view of the present study is based on the need for achievement motivation theory, and factor analysis of questionnaire data, knowledge workers consider the characteristics and needs, to meet the needs of the success of pay and benefits, job promotion, participation in management and personal life and to meet the knowledge-based staff development training and learning, challenging work, job security and management systems, such as two aspects of the merger constitutes a system of incentives content (F1). That is, through a rational incentive system to reflect the interaction between subject and object incentives motivating factor. Is to mobilize the enthusiasm of the staff of the various rewards resources. That system includes incentives F1: job promotion, the ability to play, training and learning, participation in management, job challenge, working conditions, management systems, personal life, job autonomy, leadership qualities, pay and benefits, job security and work responsibilities.

Post incentives (F2): combining organizational needs and personal needs, from job tasks, responsibilities, powers and organization of the process in relation to other mining jobs incentives employees. Therefore, the Working recognition of

achievement, job autonomy, job responsibilities, job competence, job interest, job fit and the ability to play with the job-related factors for the design they played an important incentive. We put into one category, called job incentive factor.

Cultural incentives (F3): According to McClelland's theory that everyone has to establish friendly and intimate relationships demand, knowledge workers are no exception, and knowledge workers to feel good interpersonal and team atmosphere for Work motivation has a very important impact. Cultural incentives including interpersonal, teamwork, leadership qualities, prospects for the company, the company culture five factors. These area enables knowledge workers to meet the satisfaction is energized so as to achieve a higher status.

C. ANOVA analysis

From the one-way ANOVA can be seen in Table 4, gender, age, education, company age, work age, position, title and salary level of knowledge workers there were significant differences in the extent of the various incentives.

Table IV. ANOVA statistical variables affect incentives to its degree and feel energized state analysis

Name	Sex	Age	Work age	Company age	Education	Post	Title	Salary
	F	*F*	*F*	*F*	*F*	*F*	*F*	*F*
F1	6.71	22.40**	18.59**	21.03**	63.68**	28.95**	24.38**	24.36**
F2	0.34	2.87*	3.20**	1.90	9.30**	7.59**	6.72**	3.52**
F3	2.93	6.60**	7.21**	8.59**	7.25**	1.82	3.12**	1.78
Incentive degree	1.95	12.94**	9.97**	11.49**	36.83**	12.48**	12.64**	69.54**

D. Correlation Analysis

Table 5 reflects the mean, standard deviation and correlation case study variables. From Table 5, the actual feelings of institutional knowledge workers better incentive value, to 3.81, and for job incentives and cultural motivators 2.73 and 3.08. As can be seen from Table 5, the institutional incentives, job incentives and cultural level of incentives and motivation have been significant positive correlation at the 0.01 levels. Three dimensions and is excited incentives degree turn is related to the size of institutional incentives, job motivation motivational factors and cultural factors, namely institutional incentives to motivate knowledge workers is the biggest impact, cultural motivating factor is the extent of the knowledge worker incentives minimal impact. Qualifications, duties, titles and salary levels and incentive systems have significant positive correlation at the 0.01 level, qualifications, duties, titles and salary levels and is excited significantly positive correlation between the degree at the 0.01 level.

IV. DISCUSSION

1) For knowledge workers think the most important motivating factor, domestic and foreign scholars have done a lot of Related research .As the American scholar Ma Han • Tame servant (1989) on the main motivators American knowledge workers from the study are: individual growth (33.74%), job autonomy (30.51%), business achievement (28.69%), money wealth (7.07%). The military and domestic scholars looked Peng Jianfeng (2001) study of Chinese high-tech enterprises main motivating factor derived knowledge workers: wages and incentives (31.88%), personal growth and development (23.91%), challenging work (10.14%), the company's future (7.97%), secure and stable job (6.52%) and so on . The findings and conclusions of scholars have greater consistency with my paper, large differences with the United States Han Ma • Tame servant conclusions of the study. The reason is: the U.S. payroll knowledge workers tend to have above-average incomes far, they have been able to better meet their material needs. The material needs of knowledge workers are still far from being met. Therefore, our knowledge workers tend to be seen as salaries and benefits are the most important motivating factor.

2) Although this paper, literature review, to extract the 22 motivators of universal significance. But for so many words independent incentives, lack of systematic and structured, but difficult to promote the results page. Therefore, this paper based on the actual experience of knowledge workers the incentive levels of factor analysis data, attributed to three factors: institutional incentives, job incentives and cultural motivators. In this paper, three factors with a large amount of data obtained McClelland proposed the theory has a high need for achievement consistency. This paper analyzes in turn associated with these three factors is the degree of knowledge workers incentives, found that three factors are the degree of knowledge workers incentives are significant positive correlation at the 0.01 level.

3) The paper also for knowledge workers ' gender, age, education, length of service, the Secretary of age, position, title and salary levels are all kinds of incentives and motivation degree of variance analysis, which explores the demographic characteristics of knowledge workers for the extent of their feelings and motivation factors are energized extent. On age, knowledge workers of many work-yaers feel energized

Table V Descriptive statistics and correlation analysis of the variables

Variable	mean	Standard deviation	1	2	3	4	5	6	7	8	9	10	11
1.sex	1.52	0.50											
2.Age	2.08	1.04	-0.10*										
3.work age	3.10	0.76	-0.02	0.65**									
4.company age	2.72	0.91	-0.01	0.68**	0.74**								
5.education	2.32	0.96	0.17**	-0.20**	-0.07	0.01							
6.post	2.01	0.85	-0.02	0.01	0.09*	0.08	0.47**						
7.title	2.37	0.95	-0.05	0.09*	0.17**	0.19**	0.42**	0.70**					
8.salary	2.63	1.02	-0.03	0.17**	0.22**	0.29**	0.50**	0.45**	0.50**				
9.F1	3.81	1.02	0.12**	-0.09*	0.02	-0.01	0.45**	0.36**	0.27**	0.35**			
10.F2	2.73	0.96	-0.03	-0.05	0.02	0.05	0.21**	0.19**	0.17**	0.14**	0.01		
11.F3	3.08	0.93	0.08	-0.17**	-0.08	0.04	0.16**	0.07	-0.06	-0.08	-0.00	-0.01	
12.incentives degree	3.52	0.96	0.06	-0.04	0.06	-0.10*	0.30**	0.24**	0.20**	0.48**	0.52**	0.49**	0.48**

note: * p<0.05, ** p<0.01

incentives factors and the degree of impact. This paper mainly because both the small and medium high-tech enterprises, the number of employees within the enterprise larger enterprises less, much less a corresponding number of posts, newly recruited young people , due to the junior, career development orientation is still relatively vague, easy impulsive, impulsivity, on various incentives have high expectations, so the lower the incentive for the feelings of the degree . On the other hand age, seniority or length of staff incentive extent already attention is kept constant, or did not receive attention neither senior nor higher positions, opportunities for upward mobility are slim, thus motivating factor for all kinds of practical feel and incentives degree is relatively low. About qualifications and salary for the classification of knowledge workers feel energized motivator factors and the degree of impact. About titles and duties, in this paper, based on the survey of small and medium high-tech enterprises, knowledge workers with intermediate grade or as middle management, are generally more than 5 years of seniority to employees, the psychological state of more mature, rational, to have a more practical career development target also has a strong desire to achievement of various incentives expectations more realistic, and therefore a high degree of experience and the motivation of its extent.

Staff motivation and training for our knowledge, the paper gives the corresponding suggestions:

1) Establish a sound performance appraisal system. In order to improve the incentive system is imperfect scientific issues should implement KPI, MBO and 360 degree performance appraisal method combines performance evaluation method [18].

2) Appropriate incentives to increase the intensity of salaries and benefits [19-20].

3) Strengthen the work itself inspire attention [21].

4) Strengthening incentives spirit and culture. For small and medium sized high-tech companies need the characteristics of knowledge workers, has advocated the formation of corporate culture change, the courage to take risks, candid exchanges, pay attention to the art of leadership management personnel and other characteristics [22].

5) To establish a good culture to provide comprehensive training and targeted training. Research shows: the training of knowledge workers and its turnover intention is inversely related to SMEs, its formal and long-term training but will promote greater knowledge worker organizational commitment to create greater value for the enterprise [5].

V. CONCLUSIONS

1) Knowledge workers think the most important motivators were: salaries and benefits, job promotion, teamwork, management systems, leadership qualities, its prospects and relationships.

2) The incentives of knowledge workers into three categories: institutional incentives, job incentives and cultural motivators.

3) The knowledge workers of institutional incentives, job incentives and cultural incentives and practical experience degree are the degrees of knowledge workers were positively related incentives. Their effect sizes are: institutional incentives, job incentives, and cultural motivators.

4) The following seven categories of knowledge workers to incentives and practical experience is the highest level of incentives: (1) between the ages of 31-40 years of age, (2) years of service in 6-10 years, (3) Division at age 6 -10 years, (4) has a doctoral degree, (5) as middle management, (6) with intermediate grade, (7) an annual salary of 120,000 or more knowledge workers.

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