A Study on Influential Factors of Employee Satisfaction Based on T Relation Analysis-An Ensample of a Logistics Firm

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Abstract

The employee satisfaction (abbr. ES) reflects the employee's level of job satisfaction and has direct influence on working enthusiasm. Furthermore, it affects the efficiency of entire enterprise human resources. Employee satisfaction is influenced by many factors, and the influence of each factor on employee satisfaction is subject to difference under the firms' specific environment. Based on the T relation analysis, this paper presents an evaluation model of ES influential factors in order to studying the key factors of influencing ES. Upon the above basis, this paper has a logistics enterprise exampled for raising an empirical study that assists the enterprises to examine their own problems. They may release specific improving solutions and suggestions for human resource management regarding the involved problems.

Key words: Employee satisfaction; T relation analysis; Logistics enterprises

INTRODUCTION

The employee satisfaction is reflection of attitude for assessment of his job, working experiences and environment. It exclusively refers to satisfaction level of individual, as an occupation. Having been in the time of intelligent economy, the personnel are the most important strategic asset for enterprise development. The employee satisfaction not only affects the firm's production efficiency and profit level, but also matters its prospect and destiny. Meanwhile, employee satisfaction can also effectively reflect the problems of organizational performance and the enterprise's human resources management. Employee satisfaction enhancement, potential development and loyalty improvement have become one of the key tasks for modern enterprises' human resource management and also critical points of enhancing cohesion and core competitiveness. Employee satisfaction studies commenced around 1930s (Hoppock, 1935). Locker (1976) pointed out that there are 10 factors of employee satisfaction: the job itself, pay, promotion, recognition, working conditions, welfare, self, managers, colleagues and the members of company external. However Arnold and Feldman (1982) noted the structural factors of job satisfaction include 6 items: job, superior, pay, promotion, working environment and teams. CHEN (1999), XIE (2001) conducted research on evaluation index system of ES. They released an evaluation index system of ES with 5 aspects and 16 factors. Employee satisfaction is a comprehensive reflection of personnel's satisfaction on enterprise, which is affected by many factors. And the influence degree of each factor on ES is different. Upon T grey relational analysis, this paper presents a mathematical evaluation method of scientifically measuring ES key factors influence, and has a logistics enterprise exampled. Definitely this method also has very good feasibility for other enterprises to exam the key factors of influencing employee satisfaction.

1. THE EVALUATION MODEL OF EMPLOYEE SATISFACTION INFLUENTIAL FACTORS UPON T RELATION ANALYSIS

1.1 The Modeling Mechanism of T Relation Analysis

The grey system is defined as an uncertain system with insufficient information, in which partial information is known, the other is not. The research on grey system is to find its changing rules through original data sorting. This is a path of searching data's real rules according to data. That is called generation of grey sequence. All the grey sequence can weaken its randomness through certain generation and reveal its regularity. The Grey Relational Analysis (abbr. GRA) is a kind of important analysis method for grey system. Its basic idea is to judge correlation according to the similarity of sequences geometry from incomplete information, and find out the main factors that influence the system. Furthermore, it analyzes correlation degree between the main behavior factors and related behavioral factors in the grey system. The regression analysis, variance analysis and the principal component analysis in mathematics and statistics are all used for system analysis. However these methods generally require a large amount of data, and prefer the samples are subject to a typical probability distribution. At the same time, it involves a large amount of calculation that need computer aid. It may probably appear that the quantitative results and qualitative analysis results are not consistent, which causes the systematic relationship and rules being misrepresented and confused. Under the circumstances that the statistical data in China is very short and the data gray scale is large, the method of mathematics and statistics often does not work. The grey relational analysis method compensates the weakness when system analysis uses mathematical and statistical method. GRA is feasible regardless the sample volume and sample regularity. It has small amount of calculation, convenient to use, further no occurrence of inconsistency between quantitative results and qualitative analysis results.[1] The traditional Deng's grey correlation degree[2] has some defects, specifically they are: (1) The correlation degree is significantly affected by the two ends minimum and maximum absolute difference. As long as the data sequence has a extra big or extra small value point, the correlation coefficient at each time point are affected, thus the correlation values are affected. (2) The correlation

coefficient at each time point is affected by sample size. (3) The correlation coefficient and correlation degree are also affected by resolution.[3] This makes the application range of grey relation analysis method limited. T relation degree, as a new grey relational analysis algorithm has good solution to this issue.

T's correlation degree is calculated by the approximation of relative variation trend along the factors' time consequence curve.[4] It is a kind of relatively scientific method of judging the correlation degree of objects and factors. This paper uses T correlation analysis to study the influence of each factor on the minimum wages standard in Beijing.

Calculation steps of T correlation are as follows:

Step 1: The raw data parameter sequence is provided
$X_0 = \{x_0(1), x_0(2), ..., x_0(n)\}$
M comparative sequences:

$X_1 = \{x_1(1), x_1(2), ..., x_1(n)\}$

$X_2 = \{x_2(1), x_2(2), ..., x_2(n)\}$

…… $X_i = \{x_i(1), x_i(2), ..., x_i(n)\}$

… $X_m = \{x_m(1), x_m(2), ..., x_m(n)\}$

Step 2: Standardization, which makes each sequence comparable.

Firstly, it derives: $D_0 = \dfrac{1}{n-1}\sum_{k=2}^{n}|x_0(k) - x_0(k-1)|$

$D_1 = \dfrac{1}{n-1}\sum_{k=2}^{n}|x_1(k) - x_1(k-1)|$

……

$D_m = \dfrac{1}{n-1}\sum_{k=2}^{n}|x_m(k) - x_m(k-1)|$

Then, it derives standardized consequence

$Y_0 = X_0 / D_0 \quad = \{y_0(1), y_0(2), ..., y_0(n)\}$

$Y_1 = X_1 / D_1 \quad = \{y_1(1), y_1(2), ..., y_1(n)\}$

……

$Y_m = X_m / D_m \quad = \{y_m(1), y_m(2), ..., y_m(n)\}$

Step 3: To calculate increment consequence

$\Delta Y_0 = \{\Delta y_0 = y_0(k) - y_0(k-1)\}, k = 2, 3 ...... n$

$\Delta Y_1 = \{\Delta y_1 = y_1(k) - y_1(k-1)\}, k = 2, 3 ...... n$

……

$\Delta Y_m = \{\Delta y_m = y_m(k) - y_m(k-1)\}, k = 2, 3 ...... n$ …

Step 4: To calculate the relation coefficient in each time interval.

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[1] LIU S. F., GUO T. B., DANG Y. G. (1999). *Theory of Grey System and Its Application* (The 2nd edition). Beijing: Science Press, 40-41

[2] The Chinese scholar, professor Deng Julong founded the grey system theory, a new scientific discipline of system science in the early 80's. Professor Deng Julong proposed a calculation method of grey relation degree in his books. We generally name it Deng's Relation Degree. The specific calculation method can be refered to: The Grey Prediction and Decision-Making, Deng Julong. Huazhong University of Science and Technology Press,.1986:103-104

[3] MEI Z. G. (1992). The Grey Absolute Relation Degree and Its Calculation Method. *Systematic Engineering, 5*, 43-44.

[4] TANG W. X. (1995). T Relation and Its Calculation Method. *Mathematical and Scientific Statistics and Management, 1*, 34-37.

$$\varepsilon[y_0(k),y_j(k)] = \begin{cases} \mathrm{sgn}[\Delta y_0(k)\times\Delta y_j(k)]\times\dfrac{\min(|\Delta y_0(k)|,|\Delta y_j(k)|)}{\max(|\Delta y_0(k)|,|\Delta y_j(k)|)} \\ 0, \text{ if } \Delta y_0(k)\bullet\Delta y_j(k)=0 \end{cases}$$

$k = 2,3......n \quad j = 1,2,3......m$

Step5: Calculation of correlation degree

$$r(X_0,X_j)=\frac{1}{n-1}\sum_{k=2}^{n}\varepsilon[y_0(k),y_j(k)]$$

j=1,2,3......m

Given that the amount of ES influential factors is big, the influence levels of each ES factor however are different among each firm's specific situation. The gross satisfaction is regarded as referred sequence (X_0), the several influencing factors are defined as the sequences compared (X_i). The key factors that influence the gross employee satisfaction at present stage can be identified by calculating the T relation. Thus it facilitates the enterprises improves these factors gathering all resources and enhances its human resource management levels.

1.2 The Evaluation Index System of Employee Satisfaction Influential Factors

According to the studies of domestic and foreign researchers on ES influence factors, this article analyzes the ES influential factors through 5 aspects: job position, working environment, working reward, team cooperation and enterprises development.

1.2.1 Job Position

The job position plays an important role of deciding employee satisfaction. It briefly includes the following 6 dimensions: Firstly, does the job position provide an opportunity of meeting employee's personality and develop their skills and ability? Does it provide feedback on their performance, namely offer them a job challenged, of which each individual is competent? Secondly, does the job have individual obtained success and received a sense of achievement? Thirdly, does the position provide relatively big development potentials for the employee? Fourthly, does the job provide employee psychological security? Fifthly, is the job diversified? Is it a treadmill? Finally, does the job provide sufficient career training?

1.2.2 Working Environment

The working environment is one of the important indexes of measuring the working comfort for any employee. The employee will lost his interests on the job, thus he will not enjoy the assignments if the working environment is over inferior. The working environment satisfaction briefly includes the following 4 dimensions: Firstly, it is the working places' natural environment that includes moisture, brightness, noise, smells and the other environmental factors. Secondly, it is the working places' equipments environment, that is, whether the employee can conveniently obtain and use required tools and facilities. Thirdly it is the working hours and amount of working overtime. Finally, it is about the safety protection in the working place.

1.2.3 Working Reward

The employees always expect reasonable rewards after hard work. The rewards to employees not only meet the fundamental needs of life and working, but also respect their contributions. The following aspects demonstrate the satisfaction degree on working rewards: Firstly, it is the fairness degree of remuneration. It specifically includes internal, external and self equity. Namely does the enterprise remuneration system reflect the difference of comparative values for its internal positions? Does it reflect the contrast of every position holder's salary level plus individual effort on the external remuneration level of labor market? Secondly, it is the reasonability and completeness of social insurance, vacation, health check and other social welfare system. Thirdly, does the enterprise have fair and reasonable promotion institutions?

1.2.4 Team Cooperation

A smooth teamwork is one of the important conditions to guarantee a harmonious working atmosphere. It is also an important factor that influences the employee satisfaction. The satisfaction on team cooperation can be reviewed from the following aspects: Firstly, it is the situation of satisfaction and trust in term of the direct leader's ability specifically including mutual respect, trust, support and guidance between the superior and subordinates. Secondly, it is the satisfaction on colleagues' cooperation. It notes that the employee has mutual understanding, good cooperation, support and interpersonal relationship with the other members. It also says a harmonious coordination and reasonable labor division. Thirdly, it is the team's gross responsibilities and similarity of knowledge, conceptions and value orientation. Finally, it is the clarity of information exchange channels.

1.2.5 Enterprise Development

The development of enterprise will provide a good platform for the employee development, which will directly affect the employee satisfaction on enterprises. The following aspects present the satisfaction of enterprise development status: Firstly, it is the cognition of enterprise perspective, development goals, operation strategies and company cultures. Secondly, it is the participation in the enterprise management. Finally, it is the sense of glory on enterprise social image.

The author designed a satisfaction evaluation system including 27 indicators from the above 5 aspects shown in Table 1.

Table 1
Indicator System of Employee Satisfaction Influential Factors

Influence Factors		Indicators
Gross Employee Satisfaction (ES)	Job Position	The existing position job fulfillment(JF)
		The existing position job challenge(JC)
		The existing position job achievement senseJA
		The existing position job development(JD)
		The existing position job psychological security(JS)
		The existing position job variance(JV)
		The existing position job career training (JE)
	Working Environment	Working Places Natural Environment(EN)
		Working Places Equipment Environment(EF)
		Working Hours(ET)
		Working Places Safety Protections(EP)
	Working Rewards	Reflection of individual payment on internal positions comparative values.(RR)
		Reflection of individual payment on degree of effort(RI)
		Comparison of individual payment to external labor market.(RC)
		Completeness of social insurance(RS)
		Completeness of vacation, health check and the other welfare institutions.(RW)
		Fairness and reasonability of promotion institution(RP)
	Teamwork	Satisfaction to direct leader ability(TL)
		Harmony of interpersonal relationship with colleagues(TM)
		Reasonability of team labor division(TW)
		Team gross sense of responsibility(TR)
		Clarity of team information exchange channel(TI)
	Enterprises Development	Cognition of enterprise development goals(DO)
		Cognition of enterprise operation strategies(DS)
		Cognition of enterprise culture(DC)
		Participation of enterprise operation management(DE)
		Sense of glory on enterprise social image(DP)

In the employee satisfaction survey questionnaire, the gross satisfaction level and 27 indicators are divided into 5 standards: very satisfied, satisfied, medium, not much satisfied, very much dissatisfied. The values of the five levels respectively are 5, 4, 3, 2 and 1. The respondents are required to select one choice from 5 different levels regarding their overall satisfaction and 27 indicators.

2. AN EMPIRICAL STUDY OF EMPLOYEE SATISFACTION BASED ON T RELATION ANALYSIS IN A LOGISTICS ENTERPRISE

2.1 T Relation Analysis of Employee Satisfaction in a Logistics Enterprise

According to the above conceptions of T relation analysis on ES evaluation, this article conducts an empirical study of employee satisfaction in a large railway logistics enterprise. The railway logistics enterprises have over 15600 employees, the key transportation stations are 10.

It is a large state-owned railway logistics enterprise. The development of market economy makes the logistics market competition increasingly intensive. The railway logistics enterprise suffers challenges that hitherto it has never met. The shortcomings of enterprise's under-developed management systems have gradually revealed, the most considerable aspect is the existing problems in human resources management. The brain drain and low working attitude have been seriously hindering enterprise's further development. The low employee satisfaction is an essential causation that leads to these problems. For further analysis on the employee satisfaction, the author designed a satisfaction questionnaire according to the 27 indicators in Table 1. The survey sheets were handed out in the big business stations of railway logistics enterprises. In this survey, totally 1500 questionnaire sheets were issued, 1216 valid questionnaires were collected. Based on the survey data, the author calculated the T relation degree of gross satisfaction and the influencing factors, shown in Table 2.

Table 2-A
The Matrix of Employee Gross Satisfaction T Relation

	JF	JC	JA	JD	JS	JV	JE	EN	EF
ES	0.6764	0.6011	0.7398	0.8127	0.7003	0.7898	0.7967	0.6019	0.5997

Table 2-B
The Matrix of Employee Gross Satisfaction T Relation

	ET	EP	RR	RI	RC	RS	RW	RP	TL
ES	0.6012	0.6285	0.8823	0.8194	0.7659	0.6198	0.6879	0.7792	0.7698

Table 2-C
The Matrix of Employee Gross Satisfaction T Relation

	TM	TW	TR	TI	DO	DS	DC	DE	DP
ES	0.7011	0.7862	0.7409	0.7009	0.6103	0.7589	0.7182	0.8002	0.7382

T relation matrix shows:

$\gamma(ES,RR) > \gamma(ES,RI) > \gamma(ES,JD) > \gamma(ES,DE) >$

$\gamma(ES,JE) > \gamma(ES,JV) > \gamma(ES,TW) > \gamma(ES,RP) >$

$\gamma(ES,TL) > \gamma(ES,RC) > \gamma(ES,DS) > \gamma(ES,TR) >$

$\gamma(ES,JA) > \gamma(ES,DP) > \gamma(ES,DC) > \gamma(ES,TM) >$

$\gamma(ES,TI) > \gamma(ES,JS) > \gamma(ES,RW) > \gamma(ES,JF) >$

$\gamma(ES,EP) > \gamma(ES,RS) > \gamma(ES,DO) > \gamma(ES,EN) >$

$\gamma(ES,ET) > \gamma(ES,JC) > \gamma(ES,EF)$

Therefore, the indicators that have sufficient impact on gross ES in this railway logistics enterprises include the reflection of personal income on the comparative values of internal positions, the reflection of individual payment on individual efforts, the development potential of existing position, participation status of enterprise operation and management, the existing position career training and assignment diversification. Among all these factors, the reflection of individual payment on comparative values of internal position holds the most significant factor on gross employee satisfaction. By comparison, the following factors have relatively lower impact on ES, they are working place equipment environment, existing work challenges, working hours and natural environment in working place. Regarding the upper level index classification, the important factors that currently influence the enterprise employee satisfaction are working rewards and job position, which is the working environment matters less.

2.2 Solutions and Suggestions on Improving Employee Satisfaction for the Railway Logistics Enterprise

According to the grey relation analysis on the influential factors of ES in this railway logistics firm, this article notes that the railway logistics company need solving the existing problems through the following aspects, creating a scientific human resource management system, improving ES and promoting the efficiency of human resource utility.

Firstly, it needs creating a scientific remuneration system based on position evaluation, payment survey and performance evaluation of labor market. Among the factors that influence the gross ES, the reflection of individual payment on comparative values of internal position and the reflection of payment on individual hard working have the most considerable effects on ES. However it implies the internal and self fairness of firm's remuneration system. The internal equity is defined that the difference of each position value is reflected by payment institution. That is, the position holder's payment might be different due to the

difference of his position's importance. Self fairness refers that the employee payment should be directly proportional with his contributions. The internal fairness of railway logistics firm can be well solved through the position value evaluation. It needs evaluating the factors that affect the positions' comparative importance inside the enterprise by creating scientific position values evaluation system, they are responsibilities of firm's internal positions, qualification required by each position, complex and intensity of each position. The position payment levels are designed upon the grades of position evaluation. So that the firm's internal position values difference can be reflected by the individual income. The self fairness of railway logistics employee can be realized through performance evaluation system. Namely the individual working performance will be evaluated. The evaluation results and payment are linked, so that the employee income reflects individual's efforts.

Secondly, it needs enhancing employee career management and promoting the diversification of working assignments. The issue of development potential of existing work has become an important indicator of gross employee satisfaction. The railway logistics enterprises may design multifarious career development path and design career development plan with employee to improve their satisfaction. The premise of strengthening employee career management is the improvement of position design. The promotion or rotation relationships and its corresponding requirements for each position need to be well sorted out. Thus, any position holder is clear of self career development path. In order to make the employees choose their career development direction according to their own preference, the enterprise may design multiple career development paths, which is extremely important for the technicians of railway logistics enterprise. Some experienced technical staff may either gradually become enterprise's senior technique expertise, or enter firm's senior administration following the management channels. Besides that the firm creates vertical career development channel, it can also set up a variety of transverse career development channels to meet the desire of working diversification. The employee may practice on different positions for accumulating enough qualification for future promotions.

Thirdly, it needs strengthening employee participation of enterprise's operation and management by sharing finance and performance information. The employee enrollment of enterprise management is an official process that the top managers preside, and the leader of staff organization (i.e. workers union, workers representative committee) and (or) staff representative participate the enterprise decision making and many management tasks.

While the financial, performance and other information sharing is the base of employee participation, employees and their organizations can not involve management and make a right decision without effective information. From the perspective of employees, their participation to enterprise management can make them feel the trust from the enterprise, have a sense of achievement, as well as feel the sense of realizing their own value. Thus they may form responsibilities for the company. From the firm's point of view, employee participation can effectively eliminate their suspicion and conflicts on management innovation and the transformation, which enhances the trust and cooperation between employers and employees. The employees are encouraged by participating the discussion about issues related their interests. So the employee may work harder and create high working efficiency.

Fourthly, it is to complete the employee training system. The training management of the railway logistics firm needs caring the training demand and plan design. It may conduct from two aspects, from top to the bottom, and vice versa. One side is that the railway logistics enterprises need basing the position qualification system, and analyzing the position qualification, performance status and potential career development for each position and class employee. The training demand is cleared by combining the firm's strategies with the employee career development plan. On the other hand, the direct managers need communicating to subordinates for collecting training demand and timely transfer feedback to human resources department. The frequently requested training demand can be conducted in group. Regarding the unique individual training demand, the department head or team leaders can resolve it within the group.

CONCLUSION

This paper establishes the modeling mechanism based on T relational analysis. It constructs the evaluation model of employee satisfaction influential factors from 5 aspects that include job position, working environment, working reward, teamwork and enterprise development. On this basis, this paper conducts an empirical study on a logistics enterprise. It points out the railway logistics firm that the indicators that have sufficient impact on gross ES include the reflection of personal income on the comparative values of internal positions, the reflection of individual payment on individual efforts, the development potential of existing position, participation status of enterprise operation and management, the existing position career training and assignment diversification. The solutions and suggestions regarding improving the railway logistics firm employee satisfaction are provided. The research results show that, this researching method of exploring the influential factors of employee satisfaction based on T relation analysis is applicable, it also has characteristics of easy operating, high efficiency, less amount of data preparation as well as clear presentation. This paper is expected to provide new method and perceptions for the studies of influential factors of employee satisfaction.

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