African Journal of Business Management Vol. 6(4), pp. 1559-1563, 1 February, 2012
Available online at http://www.academicjournals.org/AJBM
DOI: 10.5897/AJBM11.2447
ISSN 1993-8233 ©2012 Academic Journals

Full Length Research Paper

A study of 'personality-will-conduct–performance' of innovation-based on Chinese manufacturing enterprises

LongYun An[1] Liang ying[2]* and Liu Zeren[1]

[1]School of Economics and Trade, Xihua University, No. 999, Jinzhou Road, Chengdu, Sichuan, China.
[2]Department of Social Work and Social Policy,School of Social and Behavioral Sciences,Nanjing University,22 Hankou Road, Nanjing, 210093, P. R China.

Accepted 9 December, 2011

Based on Chinese manufacturing enterprises, this paper studied the major factors which affect business innovation of manufacturing enterprises and improve methods through the innovation personality theory combined with organizational climates. On the basis of the researches in innovation, personality, innovative organizational climates and incentives to innovate, many medium-sized manufacturing enterprises were analyzed through interviews and questionnaires. Through empirical analysis of these factors and impact of innovation process, the paper finally proposes a model of "personality - will - conduct - performance" for future organizational innovation.

Key words: Chinese manufacturing enterprises, innovation, atmosphere, motivation, innovative mechanisms.

INTRODUCTION

Recent years, manufacturing industry in China is facing unprecedented challenges and opportunities. Undoubtedly, innovations of Chinese manufacturing enterprises are confronted with conflicts from high awareness of innovation with low innovation performance, and high innovation incentives with low innovative power. These results, in conflict, affects on national innovation strategy and enterprise capacity environment. Meanwhile, it causes conflict effects on inspired expectation and employee's feeling. Researches on the firms are aimed at creating a suitable environment; it purposes on improving the capability of independent innovation by management improvement. Through targeted interviews with senior leaders from typical large manufacturing enterprises, it obtains first-hand information and an agreement that improves innovation of their enterprises by inner management. Innovative theoretical research has gone through the following stages:

1) Innovation levels to innovation types.
2) Individual innovation to organization innovation.
3) Innovation affected by environments to subjective perceptions of innovation environments.

So many achievements have been gained in these studies such as school of psychology measurement (Guilford, 1950) who put forward that innovation was an outward behavior by emanative thinking. They made a quantitative measure-ment of innovation, but their study was limited to individuals.

School of personality traits (Barron, 1968,1969)who thought individuals with high innovation, had a series of personality traits. On the basis of personality psychology, they inducted and summarized personality traits corresponding to innovation. Meanwhile, they made a certain empirical validation. However, the access of innovation tended to be very complicated because of so many related traits in this study. So, their study was also considered to be an individual innovation measurement.

Cognitive school (Mednick, 1962; Kirton, 1989) regarded innovation as the product of cognitive function and everyone had innovation. They perfected concept limitations of individual innovation and simplified the measurement methods for

*Corresponding author. E-mail: njulucy@163.com. Tel: 0086-13645188690.

individual innovation. They switched level measurement to type measurement of innovation. Besides, this study was suitable for cross-cultural situations. However, they were unable to describe and measure the cognitive process of human beings' minds and also belonged to individual innovation measurement.

School of social psychology (Andrews, 1975, 1985) thought that environments had effect on innovation performances. They considered social environment and innovation had an interactive relation, and defined it as organization innovation. They also called it invest theory of innovation. But their study lacked exact assessed environments and effective methods for innovation.

Under such circumstance, this paper has come into being on the basis that cognitive school's "innovation was the product of cognitive function" and school of social psychology's "environment had an effect on individual innovation performances. Through interviews and questionnaires, it studies creative talents' personality traits and climate factors in Chinese manufacturing enterprises, and analyzes their effect degree and process empirically with many medium and large manufacturing enterprises. Then, it establishes analysis model for organization innovation.

RESEARCH METHODS

Samples analysis

The samples in this study are taken from researchers in Chinese manufacturing enterprises with own R&D abilities, especially the leading enterprises. SPSS11. 5 statistical analysis software and LISREL8.7 software are adopted to make data analysis in this paper. Statistical analysis methods are as follows:

1) Descriptive statistical analysis.
2) Questionnaire reliability method: The commonly used "Cronbach α" coefficient and split-half reliability from Likert's attitude measurement are also used in this study. We use "Cronbach α" coefficient, which is over 0.7 or less, to judge whether it has acceptable reliability or not.
3) Questionnaire validity method: Firstly, we use exploratory factor analysis in SPSS11.5 statistic software to analyze construct validity of the scale. Then, we make a confirmatory factor analysis of convergent validity and discriminate validity. The main tool adopted is Lisrel8.70.
4) Hypothesis testing method with theoretical model: LISREL8.70 is adopted to analyze structural equation model, verify causal relationship between the path and the fit of data, and then test each assumption in the research model.

Statistical analysis

Two ways are used to distribute and collect questionnaires. The first way is top-down form. We participated in a large company's training program from Shanghai, and distributed 350 questionnaires to 12 R&D institutions by the organization leaders in this company. Eventually, 305 questionnaires were collected in successions and 234 were valid (Table 1).

The other way is to distribute questionnaires directly to the suitable companies. Totally, 150 questionnaires were distributed, 98 were collected and 62 were valid.

Totally, 500 questionnaires were distributed, 403 were collected and 296 were valid. The collected and valid rates are 80.6 and 59.2%. The objectives in the questionnaires samples statistic are from basic information of 21 valid enterprises' samples and individuals' samples.

Innovation research model

*Basic mode*l

The basic model for organizational innovation analysis consists of two levels (individual level and organizational level) and four stages (personality, intention, conduct and performance). The concept of this model is that organizational innovation performance is determined by individual personality traits and innovation environments in the organization. Individual personality traits will affect innovation wishes, innovation wishes will affect innovation behaviors and innovation behaviors will eventually determine innovation performance. Organizational innovation environment pushes innovation wishes.

Structural analysis of innovative personality traits

Innovative personality traits

Innovative personality traits can be summarized as intellectuality, independence, adventure, flexibility and aesthetic sense. The traits for intellectuality can be described as curiosity, wide interest and attraction by complication of things, openness of experiences and knowledge.

The trait of adventure is directly described as innovator's adventure, or seeking challenges, acceptance of instability and courage to explore new ideas.

The trait of flexibility is described as no bounding by conventions and general suspicion. The trait of confidence is directly considered as confidence and the trait of aesthetic sense means aesthetic ability and sensitivity.

Main personality traits affecting innovation

Through the questionnaire, we found that main personality traits affecting innovation of Chinese researchers are adventure, independence, curiosity, confidence and flexibility. Their degree of recognition reached 60%. In particular, the recognition of adventure, independence and curiosity reached more than 80%.

In the light of perspectives, purposes, objectives and operational considerations, this study simplifies innovative personality traits properly and removes those factors with low recognition. Adventure, independence and curiosity are selected for this study and a three dimensional structure of innovative personality is put forward. And then, it expands the contents of innovative personality.

Analysis of environmental factors for innovation

Environmental factors for organizational innovation

Environmental factors for innovation are: (Amabile,1996)

1) Nature of work, including its challenging, stability, significance and etc.
2) Teamwork, including high-qualified development team, R&D team with different skills, and etc.

Table 1. Fitting index.

Index	Suggestive value	Result	Whether in line with suggestive value
χ2/df	<3	2.54	Yes
RMSEA	<0.1	0.0612	Yes
GFI	>0.9	0.972	Yes
AGFI	>0.9	0.915	Yes
NNFI	>0.9	0.965	Yes
CFI	>0.9	0.971	Yes
PNFI	>0.5	0.631	Yes
PGFI	>0.5	0.542	Yes

3) Leadership support, including innovative ability and awareness of entrepreneurs, leadership styles, superior support, head support and so on.
4) Organizational innovative cultures, including organizational climates, organizational incentives, etc.
5) Resources guarantee, including financial support, information support, etc.
6) Work pressure, including time constraints, etc.

For senior and middle managers from Chinese manufacturing enterprises, we designed corresponding questionnaires to verify whether these factors are suitable or not. Meanwhile, we could consult with the test members whether they had other suggestion in question form.

Through the statistic results of 98 valid questionnaires, the recognition of innovative climates inside the company is ranked thus: organizational innovative culture (100%), leadership support (100%), teamwork (90%), nature of work (86%), resources support (80%), work flexibility (56%), goal setting (48%), organizational structure (40%), work pressure (36%), and physical work environment (20%).

We simplified innovative environmental factors properly, and removed those factors with low recognition. Five factors with over 50% recognition are selected to complete this study. They are organizational innovative cultures, leadership support, teamwork, resources guarantee and work flexibility.

In a word, they are organizational innovative personality, organizational innovative wishes and organizational innovative behaviors. The logic relation of inner innovative environmental factors is corresponding with individual innovative personality traits, innovative wishes and innovative behaviors. All of them guide eventual innovative performance and drives analysis model for organizational innovation.

Composition of analysis theoretical model for organizational innovation

Innovative personality traits affect the strength of innovative wishes, innovative wishes affect innovative behaviors and innovative behaviors eventually affect innovative performances. Then, they determine organizational innovation.

From the horizontal point of view, this analysis theoretic model can be divided into individual scale and organizational scale. From the vertical perspective, it can be divided into personality, wishes, behaviors and performance.

The research assumption is that each related assumption is set up as per their relations among personality, wishes, behaviors and performances in the model.

RESULTS ANALYSIS

Questionnaire survey

Innovative personality traits of researchers

The result of personality test for curiosity shows that: the total average is 4.1343 and the highest score is the first item that I have wide interest in things. The score is 4.2230. The lowest score is the third item - I am always attracted by complex things and would like to make a further study. It's score is 3.9831.

In general, these four items have higher and similar scores. The result shows that Chinese researchers have strong inner power for curiosity and desire for intelligence.

The result of independent personality test is: the total average is 2.6985 points and the highest score is first item - I always have my own unique views and ideas. The score is 3.2399. On the contrary, the lowest score is 2.2432 for the fourth items - I do not like a stable, reliable and competent work.

Overall, these four items have lower and different scores. The result indicates that most Chinese researchers have their own unique ideas and views, but they do not have strong independence. Besides, they prefer to waiting for their leaders' arrangements.

The result of adventure personality test shows that: the total average is 3.6563 and the highest score is the fourth item - I have a keen intuition and I'm ready to follow it. The score is 3.7466. However, the scores for the second, third and fourth items are very similar to each other. The score is 3.4122.

Generally, trait of curiosity gains the highest score and next is adventure trait. The lowest one is independence trait. The result indicates that Chinese researchers have strong desires for curiosity and most of them are willing to undertake certain challenging programs. But in the light of independence, most researchers are used to listen to their leaders' arrangements and expect stable and predicated working environments.

Research result is basically consistent with the results

from interviews. Chinese researchers tend to "obedient" type, and reluctant to take risks in decision-making. They prefer to working with their leaders' decisions and guidance. This characteristic is very common is Chinese enterprises and organizations due to effect from organizational mechanisms and Chinese traditional cultures. If we want some improvement in this field, we should focus on the education and improvement of mechanisms.

Analysis of organizational innovative environments

Organizational innovative cultures: According to the test of organizational innovative cultural factors, we note that: the total average for organizational innovative culture is 3.5257 and the highest score is the second item that the organization has recognized the innovative work atmosphere with a score of 3.6655. The lowest score is fourth item that the organization has a mechanism to generate innovative ideas with a score of 3.3412.

These five questions gain middle level scores, and indicate that enterprises and organizations in the sample are with a strong recognition innovation and driven innovative atmosphere, but lacked innovation mechanisms.

At present, all enterprises are developing independent innovation in a large scale. Each enterprise is concentrating on innovation from the top to the bottom. Meanwhile, they organize various studies, callings and training based on innovation. So, they have comparatively strong innovative climates. However, in the light of mechanisms, their strategies are not coordinated with mechanisms owing to organizational inertias and experience shortages. Their innovative mechanisms can not gain rapid and suitable improvements.

Flexibility analysis of researchers: As per the result of flexibility of researchers, the highest score is the third item - I am working with the degree of autonomy - with a score of 3.3480. The lowest score is the first item - I have my own degree when I decided to do and how to do - with a score of 3.0845. Three questions get medium scores, which indicate that the enterprises and organizations in the sample give researchers medium flexibility.

The result is basically conducted with the enterprises' interviews. Most interviewed enterprises have an 8 h working system. Ordinary researchers do not have the right to select programs and have to do as their enterprises' chooses.

Analysis of leadership support: The result of leadership support test shows that, the total average is 3.9371 and the highest is the third item - my leaders are with good communication and coordination ability and they support our teamwork - with a score of 3.9764. The lowest one is the fourth item that my leaders can respect different opinions and objections with a score of 3.8581. Overall, five questions gain higher and close scores, which indicate that enterprises and organization in the sample have comparatively higher leadership support.

The result shows that most interviewed leaders take great considerations of innovative activities. Also, ordinary researchers are very cautious when assessing their leaders and they tend to give them positive assessments.

Analysis of teamwork: The results of teamwork test shows that the total average is 3.8399 and the highest score is the first item that we have a team with different skilled members. The score is 4.1014. However, the lowest score is the fifth item that my partner and team members have sense of belongings and a common goal with a score of 3.6453. Five scores tend to be medium which mean that each member cares about his complementary skills, but lack the senses of belonging.

The results show that it is easy for Chinese enterprise to unite team members with various skills. But it is difficult for them to make each member sense their belonging in the team because of mechanism, resources and other limitations. The team cohesion mainly depends on personal relations and post rights.

Analysis of resource guarantee: The results for resource guarantee are: the total average is 3.1824 and the highest score is the fourth item that the organization provided me with effective assistance of professionals. The score is 3.4223. The lowest score is the first item that the organization provides me with the necessary financial support with a score of 2.8108.

Five scores are also in the medium stage, which indicate that enterprises and organizations in the sample are extremely short of resource support, especially financial support.

The results show that human resources are rich, but poor in financial support due to the interviewed enterprises' financial strengths and asset allocations. On the contrary, they act better in the assistance of professionals, for they are huge manufacturing enterprises in China.

Hypothesis testing

Correlations analysis

Before using the structural equation model software to fit the model, correlations analysis was first conducted with eleven variables. The result shows that 16 pairs of hypothetical correlation coefficients are positive and statistically significant ($P < 0.01$). Besides, the six pairs' correlations, including teamwork and innovative behaviors whose correlations are the highest with a score of 0.655, are larger than 0.5. The next one is the correlation between innovative wishes and innovative behaviors whose score is 0.619. The third one is resource guarantee and innovation performance whose

correlation is 0.612. The fourth one is innovative culture innovation and leadership support whose correlation is 0.604. The fifth one is leadership support and innovative behaviors whose correlation is 0.583. The sixth one is the adventure and innovative wishes whose correlation is 0.504, and the lowest one is working flexibility and resources guarantee whose correlation is 0.220 at P <0.01 significance level.

Further hypothesis test by structural equation model

Classification of variable and structural equation model: On the basis of conceptual model, we designed corresponding structural equation model path. In the model, 11 latent variables and 49 items are included. Innovative culture, curiosity, independence and adventure are exogenous latent variables and innovative wishes, innovative behaviors, working flexibility, leadership support, teamwork, resources guarantee and innovative performance are endogenous latent variables. Besides, deviations in the test are shown in the model δ1 to δ17. For the exogenous latent variable X item's test deviation, ε1 to ε32 is endogenous latent variable Y item's test deviation, and ζ1 to ζ is residual deviation for 7 endogenous latent variables.

Fitting test of structural equation model: We will use structural equation modeling software to test the fitting of the data. All indicators are within the acceptable range, indicating that the model fits well with the data in each aspect.

Conclusions

Organizational innovative research is a complicated systematic project. It has scientific side and artistic side, involving management, behavioral science, psychology, economics, and many cross-disciplinary. The research is not only ascendant in the world, but also the beginning of Chinese researches. Therefore, the majority of studies in this field is exploratory and is a basis for the future studies.

This research is also an exploratory attempt for future innovation of Chinese manufacturing enterprises. We hope that a certain breakthrough will bring in organizational innovative studies and offer some inspiration and proof for the researches and future innovation of Chinese manufacturing enterprises. The future researches in this field will focus on expansions. Affecting factors in the model include studied enterprises samples, studied individual samples, incentive model in the innovative process, etc.

ACKNOWLEDGEMENTS

Supported in part by Natural Science Foundation Youth Project: (Number: 70903002) and Natural Science Foundation General Project: (Number: 71173099). Supported in part by Trans-Century Training programme Foundation for Talents of Humanities and Social Science by the State Education Commission, 2011.

REFERENCES

Amabile, TM, Conti R, Coon H, Lazenby J, Herron H (1996). "Assessing the work environment for creativity". Acad. Manage. J., 5(39): 1154-1184.

Andrews F (1975). "Social and Psychological Factors Which Influence the Creative Process", In I. Taylor & JWGetzels, Perspectives in Creativity.

Barron F (1968). "Creativity and personal freedom", New York: VanNostrand.

Guilford JP (1950). "Creativity", Am. Psychologist, 5: 444-454.

Kirton MJ (1989). "A theory of cognitive", In Kirton, MJ Adaptors and Innovators: Styles of creativity and Problem solving, New York: Routledge, pp. 1-36. p 213.

Mednick SA (1962). "The Associative Basis of the Creative Process", Psychol. Rev., 69(3).