CHEMICAL ENGINEERING TRANSACTIONS
VOL. 67, 2018
A publication of AIDIC
The Italian Association of Chemical Engineering
Online at www.aidic.it/cet
Guest Editors: Valerio Cozzani, Bruno Fabiano, Davide Manca

ISBN 978-88-95608-64-8; **ISSN** 2283-9216
DOI: 10.3303/CET1867075

Relationship between Chemical Talents Ecological Environment and Innovation Performance

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There is a close relationship between the ecological environment of the chemical talents and the innovation performance. This paper adopts the method of empirical research and uses SPSS21.0 for questionnaire analysis. The research results show that the ecological environment of chemical talents is composed of three dimensions: industrial environment, living environment, and occupational environment. The innovation performance of chemical talents consists of two dimensions: innovation intention and innovation effectiveness. The industrial environment, living environment, and occupational environment satisfaction of chemical talents have significant correlation with their innovation performance. Through the above analysis, this paper proposes to start from the establishment of industrial chain, optimization of living environment, and the establishment of a career development platform to enhance the innovation intention and innovation effectiveness of chemical talents.
Chemical industry is a technology-intensive industry. Chemical talents are the foundation and the most precious resource for the development of the chemical industry. Efforts to create a talent ecological environment is conducive to the accumulation and growth of chemical talents, and it can ensure that the ecological environment will motivate the creativity of chemical talents, so as to promote the upgrading of the chemical industry and achieve sustainable development in turn.

1. Concept definition and model construction

1.1 Definition of ecological environment of chemical talents

The ecological environment of talents is to look at the growth and use of talent from an ecological perspective. Some scholars have suggested that the talent ecological environment is a dynamic and balanced system that can directly or indirectly affect the survival and development of talents (Ni et al., 2010; Liu et al., 2016). The factors affecting the talents ecological environment are analyzed from the perspective of reasons, including the relationship between talents and organizations, individual career planning, etc. (Ryan, 2011). The compositional dimension of the talents ecological environment can be divided into soft environment and hard environment (Sun et al., 2005) according to the evaluation method, or it can be divided into talents market environment, economic environment, cultural environment, living environment, natural environment, and regulatory environment, etc. (Liang et al., 2014).
The eco-environment of the chemical talents studied in this paper refers to the sum of all the factors that enable the chemical talents to achieve self-development in the process of interconnection (Amin and Karim, 2011), interplay and interaction among chemical talents, society, chemical companies and other individuals.

1.2 Connotation definition of the innovation performance of chemical talents

Innovation performance is a form of performance. From an individual perspective, it mainly refers to the degree of innovation demonstrated by an individual or a team and the degree to which innovation promotes performance. It is usually measured by the profit created by a new product or service for the company. Janssen (2011) proposed the concept and scale of individual innovation performance. He believes that individual innovation performance includes three dimensions: the generation of innovative thinking, the promotion of innovative thinking, and the realization of innovative thinking.

Please cite this article as: Wang C., 2018, Relationship between chemical talents ecological environment and innovation performance, Chemical Engineering Transactions, 67, 445-450 DOI: 10.3303/CET1867075

The innovation performance of chemical talents discussed in this paper is mainly to study the knowledge discovery, innovation intentions, and innovation output of chemical talents in the process of achieving innovation goals (Best et al., 2004). This innovation performance is not merely a manifestation of a process, it is more of a combination of a series of innovative elements such as chemical talents, changes in production methods, and changes in environment (Hottenrott and Lopes-Bento, 2016).

1.3 Chemical talents ecological environment and innovation performance

Eco-environment construction is a major practical issue for the sustainable development of chemical parks and industrial parks with independent chemical blocks (Chen et al., 2016). Only those chemical parks with healthy ecological environment development and industrial parks with independent chemical blocks can gather chemical talents from all directions, demonstrate their regional competitive advantages among many chemical parks, get more opportunities for cooperation with other companies or scientific research institutions, and produce more new chemical products to improve the competitive position of the park (Qureshi et al., 2016).

At the same time, when the talents in the chemical industry actively study, they will have a better collective learning effect and form a good learning atmosphere, which will in turn facilitate the accumulation and dissemination of knowledge, promote the research and production of new products and new processes, the mutual exchange and communication of talents in chemical companies have gradually revealed their invisible knowledge and experiences (Tsai and Liao, 2017). The gathering of chemical talents in companies has led to an increase in the number and proportion of talent employees, which will have an impact on the innovation performance (Wu et al., 2016).

1.4 Theoretical model construction

The research object of this paper is the talents in chemical companies. This paper takes the relationship between the eco-environment of chemical talents and the innovation performance as the main research line, basing on a certain scale of interviews and questionnaire surveys; it studies the influence of the chemical talents ecological environment on the innovation performance and its mechanism of action under China's innovation-driven strategic scenario (Hasanov et al., 2014). According to the research content of this paper, the following hypotheses are proposed.

H1: The ecological environment of chemical talents consists of the industrial environment, living environment, and occupational environment.

H2: The innovation performance of chemical talents consists of innovation intention and innovation effectiveness;

H3: The dimensions of the eco-environment of chemical talents are significantly related to the overall innovation performance.

According to relevant research literatures and theoretical hypotheses, the concept model of the study is determined, as shown in the following Figure 1.

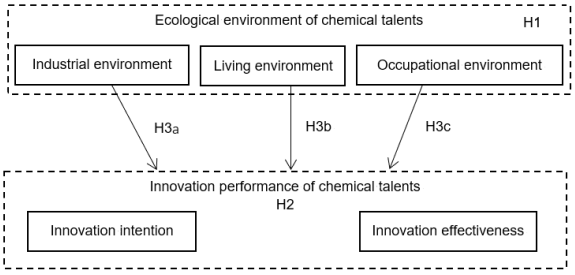

Figure 1: Concept Model

2. Research design and variable measurement

2.1 Development of scale for satisfaction of chemical talents eco-environment

This study draws lessons from the more mature scales at home and abroad, and makes appropriate corrections based on the research purpose. There are seven items for the satisfaction of the eco-environment of chemical talents, as shown in Table 1.

2.2 Development of chemical talents innovation performance evaluation scale

The chemical talents innovation performance scale refers to Janssen's scale and constructs a 7-item

innovation performance evaluation scale, as shown in Table 2. The scale has been widely used in domestic research and has a good reliability and validity.

2.3 Sample selection and data acquisition

The sample survey of this paper took into account the differences in the Nanjing area and the feasibility of the data. Jiangning District, Jiangbei New District and Liuhe District were selected as the research area to conduct a questionnaire survey of chemical talents. The questionnaire took the form of an online survey and collected 317 questionnaires, including 19 invalid questionnaires and 278 valid questionnaires, with an effective rate of 94.01%.

Of the 317 respondents, 264 were men, accounting for 83.28%; 53 were women, accounting for 16.72%. The age structure of respondents was mainly distributed between 35-50 years old, accounting for 83.19% of the total respondents. The respondents were mainly college graduates and above, with a ratio of 71.37%.

3. Empirical test of the influence of satisfaction degree of chemical talents eco-environment on the innovation performance

3.1 Analysis of satisfaction degree of chemical talents eco-environment

To ensure the reliability and validity of the chemical talents eco-environment satisfaction scale, the SPSS 21.0 statistical analysis software was used to perform exploratory factor analysis and reliability test on the items using the varimax rotation. The analysis results are shown in Table 1. The KMO sphere test is 0.893 and the Sig value is 0.000, indicating that the scale is suitable for exploratory factor analysis.

The results show that items 1 and 3 constitute the first factor, which effectively reflects the satisfaction of the chemical talents with the industrial environment in their district, therefore, the factor is named “industrial environment” and its reliability index Cronbach's α value is 0.684, the contribution rate is 35.08%.

Items 2, 4 and 5 constitute the second factor, which reflects the satisfaction of chemical talents with the living environment in their district. Therefore, the factor is named “living environment”, and the reliability index Cronbach's α value is 0.860, the contribution rate is 29.53%.

Items 6 and 7 constitute the third factor, which reflects the satisfaction of the chemical talents with the occupational environment in their district. Therefore, the factor is named “occupational environment”. The reliability index Cronbach's α value is 0.845, and the contribution rate is 28.55%.

The cumulative contribution rate of the three factors is 93.16%. The above indicators have reached the test standards, indicating that the reliability and validity of the scale is good, suitable for statistical analysis and hypothesis testing.

Table 1: Test of satisfaction scale for chemical talents eco-environment

Items	Factors			Extraction
	Industrial environment	Living environment	Occupational environment	
Your satisfaction with the introduction of industrial-oriented talents in the district	.659	.573	.481	.993
Your satisfaction with the facilities and educational investment in the district	.271	.838	.203	.817
Your satisfaction with the development and improvement of the industrial chain in the district	.836	.189	-.231	.788
Your satisfaction with social security and medical care in the district	.234	.858	-.041	.792
Your satisfaction with the current traffic and housing situation in the district	.387	.751	.312	.811
Your satisfaction with the transformation of scientific and technological achievements in the district	.252	.075	.838	.771
Your satisfaction with the convergence of the training education you received and your actual working situation	.331	.142	.848	.849

With regard to the selection of control variables, this study conducts a differential test on the industrial environment, living environment, and occupational environment using the basic information of chemical talents as variables respectively.

The results show that there is a significant difference in the perception of chemical talents with different educational backgrounds in terms of satisfaction with the industrial environment (P=0.012<0.05). Chemical talents with bachelor's degrees have higher satisfaction with the industrial environment and chemical talents with master's degrees or above have, lower satisfaction with the industrial environment, and the difference between them is 0.383. This result reflects that higher degree chemical talents paid more attention to the industrial environment.

The results show that there is a significant difference in the perception of the satisfaction of living environment among chemical talents with different professional titles (P=0.036<0.05). Chemical talents with middle-level professional titles and below had higher satisfaction with the living environment, and chemical talents with sub-high-level and above had lower satisfaction with the living environment, the difference between the two is 0.280. This result reflects that chemical talents with higher professional titles paid more attention to the living environment.

The results also show that there was a significant difference in the perception of occupational environment satisfaction among chemical talents of different age groups (P=0.029<0.05). Chemical talents below the age of 40 had lower satisfaction with the occupational environment, indicating that the young and middle-aged chemical talents had higher requirements on the occupational environment, hoping their professional career would develop further.

3.2 Chemical talents innovation performance analysis

To ensure the reliability and validity of the chemical talents innovation performance scale, exploratory factor analysis and reliability test were performed using the varimax rotation, the analysis results are shown in Table 2. The KMO sphere test is 0.882, Sig value is 0.000, indicating that the scale is suitable for exploratory factor analysis.

The results show that items 2, 3, 4 and 5 constitute the first factor, which effectively reflects the satisfaction of chemical talents with their own innovation intentions. Therefore, the factor is named “innovation intentions” and its reliability index Cronbach's α value is 0.849, the contribution rate is 44.14%.

Items 1, 6, and 7 constitute the second factor, which reflects the satisfaction of chemical talents with their own innovation effectiveness. Therefore, the factor is named “innovation effectiveness”. Its reliability index Cronbach's α value is 0.860, and the contribution rate is 51.03%.

The cumulative contribution rate of the two factors is 95.17%. The above indicators have reached the test standards, indicating that the reliability and validity of the scale are good, suitable for statistical analysis and hypothesis testing.

Table 2: Chemical talents innovation performance scale test

Items	Factors		Extraction
	Innovation intentions	Innovation effectiveness	
Continually providing new ideas to improve current situations	.588	.789	.820
Actively supporting innovative ideas	.749	.406	.727
Finding new working methods, skills or tools through learning	.852	-.199	.765
Transformed innovative ideas into practical applications	.822	-.376	.817
Proposed some original solutions to problems through learning	.885	-.266	.854
Influenced the creative atmosphere of the team or organization at work	.075	.781	.615
Improved the way to communicate with customers at work	-.067	.813	.665

With regard to the selection of control variables, this study conducts a differential test on the innovation intentions and innovation effectiveness using the basic information of chemical talents as variables respectively.

The results also show that there is a significant difference in the perception of innovation intentions of chemical talents with different educational background (P=0.031<0.05), chemical talents with a master degree or above have higher innovation intentions. The results show that there is a significant difference in the perception of innovation effectiveness among chemical talents with different professional titles

(P=0.022<0.05), chemical talents with sub-high-level and above professional titles have higher awareness of innovation effectiveness.

3.3 Regression analysis of the influence of chemical talents eco-environment on innovation performance

In order to study the influencing mechanism of the satisfaction degree of chemical talents eco-environment on innovation performance, this study uses innovation performance as a dependent variable, and puts it into the independent variables of industrial environment, occupational environment, and living environment to test the influence of independent variables on the dependent variable. The results are shown in Table 3.

Table 3: Regression analysis of the influence of chemical talents eco-environment on innovation performance

	Innovation performance	
	Standardized coefficient B	Standard error of B
Industrial environment	.612	.363
Living environment	.805	.284
Occupational environment	.957	.278
F	77.464	
R^2	.826	
ΔR^2	.821	

The results show that the influence of the independent variable chemical talents eco-environment on the innovation performance is significant. The F value of the equation is 77.464, and the significance level is P = 0.014<0.05. It shows that the ecological environment of chemical talents has a significant positive effect on innovation performance.

Specifically, in the three dimensions of the eco-environment of chemical talents, the influencing coefficients of the industrial environment, living environment, and occupational environment are all significant. (1) The standardized coefficient of industrial environment is .612, and the significance level is P = 0.004<0.05, which indicates that the industrial environment satisfaction has a significant positive effect on the chemical talents innovation performance. With the improvement of satisfaction of industrial environment, the innovation performance of chemical talents will also increase. (2) The standardized coefficient of living environment is .805, and the level of significance is P=0.000<0.05. The satisfaction of living environment has a significant positive effect on the innovation performance of chemical talents. With the improvement of satisfaction of living environment, the innovation performance of chemical talents also increases with it. (3) The standardized coefficient of occupational environment is .957, and the level of significance is P = 0.000 <0.05. Satisfaction of occupational environment has a significant positive effect on the environment performance of chemical talents. With the increase of satisfaction of occupational environment, the innovation performance of chemical talents also increases with it.

The results show that, compared with the industrial environment, the satisfaction of the living environment and occupational environment has a more pronounced effect on the innovation performance of chemical talents. Therefore, the creation of a professional environment for chemical talents can serve as an important starting point for the government to create an ecological environment for chemical talents(Zheng,2017).

4. Conclusions and countermeasures

This paper takes chemical talents as the research object, develops measurement scales for the eco-environment and innovation performance of chemical talents, and uses empirical research to test the effect of chemical talents' satisfaction with the eco-environment in their districts on the innovation performance of chemical talents, and draws three conclusions:

First, there is a significant difference in the perception of chemical talents with different educational backgrounds in the satisfaction of the industrial environment. The construction of chemical talents eco-environment should build a complete upstream and downstream industry support platform for chemical talents with different educational backgrounds from the perspective of industrial chain construction. At the same time, there are significant differences in the perception of the satisfaction of the living environment of the chemical talents with different professional titles. The construction of the chemical talents eco-environment should begin with the talents' living environment and improve the quality of life for the talents. However, there are significant differences in the perception of occupational environment satisfaction among chemical talents of different ages. The construction of chemical talents eco-environment should focus on creating an occupational development platform for talents of different ages in the occupational environment, and gradually realize the

professional pursuit for the talents.

Second, there is a significant difference in the perception of innovation intentions among chemical talents of different educational backgrounds. The improvement in the innovation performance of chemical talents can be started by increasing the innovation intentions of talents with different educational backgrounds and encouraging talents to innovate actively. At the same time, there are significant differences in the perception of innovation effectiveness among chemical talents with different professional titles, and the innovation performance of chemical talents can be improved starting from innovation effectiveness, so as to motivate talents to innovate from the perspective of output.

Third, regression analysis shows that the industrial environment, occupational environment, and living environment in the chemical talents eco-environment have a significant positive effect on the innovation performance. It means that only when the ecological environment is well established, are the chemical industry talents willing to innovate and achieve output.

Acknowledgments

This study was supported and sponsored by the Education and Science Fund of the 13th-five project of Jiangsu Province (D/2016/03/69), the Qing Lan Project, the Third Jiangsu Overseas Research &Training Program for University prominent Young & Middle-aged teachers and Presidents, the Key Project of Jiangsu Vocational Institute of Commerce (NO.JSJM16002), Excellent Innovation Team Fund of Jiangsu University Philosophy and Social Sciences (2017ZSTD028) ,and Excellence Team Fund about Economic and Technological Innovation of Jiangsu Vocational Institute of Commerce. We are grateful for their supports.

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