Relationships Among Prerequisite Variables, Organizational Quality Immunity and Health

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Abstract —This study aims at fostering organizational quality specific immunity and health. It uses the 3 methods of: i) projection pursuit, ii) catastrophe progression and iii) structure equation modeling to empirically analyze the relationships among: i) prerequisite variables, ii) organizational quality immunity and iii) health. It combines: i) structural equation modeling results, ii) organizational quality monitoring (partially mediating variables of relationships among organizational self-esteem of employees), iii) insider identity perception of employees and organizational health, iv) organizational quality defense (partially mediating variables of relationships among organizational self-esteem of employees, insider identity perception of employees and organizational health), iv) organizational quality memory (not mediating variables of relationships among organizational self-esteem of employees), v) insider identity perception of employees and organizational health. Organizational self-esteem of employees, insider identity perception of employees are all significantly conducive to organizational health. Organizational quality monitoring, organizational quality defense and organizational quality memory are all significantly conducive to organizational health.

Keywords - organizational quality specific immune; organizational health; style; prerequisite variables

I. INTRODUCTION

Enterprises are exposed to a variety of sources and distortion sources that have similar attributes of antigenic stimulation, viruses and bacteria. This make enterprises to be confronted with dynamic external and internal environment changes, where phenomenon attack affect organizational quality seriously. Enterprises should carefully watch dynamic external and internal environment time changes, and attach importance to organizational quality complications. Under the circumstances of dynamic external and internal environment change, exploiting the special functions of organizational immunity, organizational quality immunity, organizational quality specific immunity, enriching and refining organizational quality monitoring functions, organizational quality defense soft and hard elements, and organizational quality memory functions are the key channels to enhance quality performance and foster organizational health. Therefore, how to enhance and foster organizational quality specific immune, quality performance and organizational health have become one of the focal points in quality management research fields and practice scopes. Employees are key and important components of organization and team improvement team, they are main execution bodies of quality management operation and activity, cognition and behavior of employees are influential factors that affect organizational quality immune, organizational quality specific immune and organizational health. Theoretical and practical research outcomes indicate that organizational self-esteem of employees, insider identity perception of employees are the key factors that affect three construction elements of organizational quality specific immune and organizational health. Organizational self-esteem of employees, insider identity perception of employees can affect organizational health directly, which can also affect organizational health indirectly through the mediating function of organizational quality monitoring, organizational quality defense (organizational quality defense soft and hard elements) and organizational quality memory. Thus this study sets organizational self-esteem of employees, insider identity perception of employees as prerequisite variables, puts emphasis on the function mechanism of organizational self-esteem of employees, insider identity perception of employees on organizational health by mediating variables of organizational quality specific immune. Organizational health, organizational quality monitoring and organizational quality defense all include many dimensions and corresponding evaluation indicators, therefore this study adopts projection pursuit method to avoid negative influences of higher dimensions, nonlinear relationships among dimensions and dimensions, and linear or nonlinear relationships among evaluation indicators and evaluation indicators. Based on results of projection pursuit method, this study adopts catastrophe progression method to carry out calculation and estimation of statistical evaluation values of organizational health, organizational quality monitoring and organizational quality defense. On the basis of evaluation values, this study finally
uses structure equation modeling method to empirically analyze relationships among prerequisite variables (organizational self-esteem of employees, insider identity perception of employees). Organizational quality specific immune and organizational health.

II. THEORETICAL FRAMEWORK AND HYPOTHESIS

Quality is life of enterprise and guarantee, organizational quality immune is the core structure of organizational immune, which is quality level expression and characterization of organizational immune, this study refers to the connotation of organizational immune, organizational quality immune refers to the abilities that enterprises identity internal and external alien that affect quality, eliminate the factors that can threaten to organizational quality and further produce and quality-related memory in order to improve quality performance and maintain of organizational health[1-6]. Through in-depth interviews with relevant experts in the field of quality management, top and middle managers of quality management department, production and technical departments of some large and medium-sized enterprises, organizational quality immune can be divided into organizational quality specific immune and organizational quality non-specific immune, organizational quality specific immune is the core and key frame of organization quality specific immune, whose construction elements are organizational quality monitoring, organizational quality defense and organizational quality memory respectively[1-6]. Organizational quality monitoring, organizational quality defense and organizational quality memory are the quality level embodiment and direct characterization of organizational monitoring, organizational defense and organizational memory [1-2]. Refer to definition of organizational defense [1-6]), organizational quality defense refers to the behavior that organizations resist and the eliminate internal and external quality safety incidents and threatening to quality factors on the premise of organizational quality monitoring. Refer to the definition of organizational memory of Walsh, organizational quality memory refers to that organizations store, share and integrate quality experiences and quality knowledge through methods and means of storing quality knowledge and information in order to achieve the goals of using quality information and knowledge to execute effective quality decision making [1-6].

Organization quality monitoring includes organization quality internal monitoring and external monitoring, which are all effective medium and ways to foster organizational health, which are conducive to balanced organization structure, active organization function, social harmony and environment adaptation [7]. Organization quality defense is a social learning process, which includes organizational quality defense soft elements based on leadership attention level, employee involvement level, supplier relationship level and stressing on customer demand level, and organizational quality defense hard elements on the basis of levels of product design, process management, statistical control and feedback, the former elements put emphasis on interpersonal and social non-mechanism soft measures, the latter elements mainly include micro level hard measures of activity and mechanism[8-10]. Organizational quality defense can promote organizational health. Organization quality memory advocates quality information sharing and transfer, quality knowledge database construction and optimization, quality information retrieval and quality information database maintenance, establishing, saving, recording and storing organizational quality monitoring solution sets and organizational quality defense schemes, which is one of the most important variables of fostering organizational health. We propose hypothesis H1,

Hypothesis H1 Organizational quality specific immune is conductive to organizational health (OH) significantly

Pierce et al defined the connotation of insider identity perception, suggested that insider identity perception of employees mainly referred to the perception that employees obtained own personal space and gained acceptance as a member of organization, which reflected the perceived degree of obtaining insider identity of organization members or team members for employee[11]. Employees with high levels of insider identity perception can actively and engage in work, possess a high degree of job embeddedness and job involvement, inspire stronger organization identity and organizational commitment, promote more organizational citizenship behavior[12], enhance insider role performance and extra role performance, reduce turnover rate, reduce work deviant behavior, make efforts to correct job deviations actively, make efforts to quality production, suppress and prevent CWB, actively foster organizational quality monitoring, organizational quality defense of hard elements and soft elements, organizational quality memory, enhance organizational health, reduce the number of quality production accidents, reduce the negative impact caused by quality production accidents. In summary, we propose hypothesis H2,

Hypothesis H2 Insider identity perception of employees (IIP) can affect organizational health directly, insider identity perception of employees can affect organizational health through organizational quality specific immune indirectly, organizational quality monitoring (OQM), organizational quality defense (OQF) and organizational quality memory (OQME) are mediating variables of relationships among insider identity perception of employees and organizational health.

Pierce et al defined the connotation of organizational self-esteem, organizational self-esteem refers to the degree of employees believe that they are capable staff, believe that they can do the job with high competence, believe that they are worthy to the organization, they are key employees of organization, which is an important indicator of self-evaluation, self-value perception, judgment and achievement[13]. Employees with a high level of organizational self-esteem will treat organizations as carriers to meet their needs, are deeply embedded and involved in work[13], integrate organizational values, values systems, organizational goals, organizational needs and organizational performances into own values, own value systems, personal development goals, personal needs and individual performances. And employees with a high level of
organizational self-esteem can perceive that they are important and valuable to organization[14], the work they do is meaningful, they realize that safe production plays an important role in the growth and development of enterprises, achievements feeling, a sense of self-confidence and self-perceived value drives employees to actively implement quality concepts, stimulate endogenous motivation and intentions of quality, adopt proper quality behavior, make contribution to enhance organizational health and clearly locate quality roles and responsibilities, actively foster organizational quality monitoring, organizational quality defense of hard elements and soft elements, organizational quality memory, improve organizational health. In summary, we propose hypothesis H2,

Hypothesis H2 organizational self-esteem of employees (SE) can affect organizational health directly, organizational self-esteem of employees can affect organizational health through organizational quality specific immune indirectly, organizational quality monitoring, organizational quality defense and organizational quality memory are mediating variables of relationships among organizational self-esteem of employees and organizational health.

III. EMPIRICAL ANALYSIS

A. Data collection and analysis

This study sorts and statistics related to scales and corresponding entry, variables, and makes questionnaire. To prevent blind group thinking, thinking inertia and adverse effects of common method biases, this study adds a few multi-items in the questionnaire that have nothing to do with the investigation subject and research purpose, final questionnaire includes control variables, demographic characteristics and survey multi-items, questionnaire uses likert 1-7 subscales. First of all, this study distributes 100 pre-test questionnaire to related experts, top managers, middle managers and first-line managers, employees of manufacturing enterprises through exploratory factor analysis test and confirmatory factor analysis test to determine accuracy of corresponding survey variables and multi-items. Based on the pre-test, this study conducts formal questionnaire through questionnaires interviews, on-site questionnaire, Email, relevant government agencies, specialized research institutions to top managers, middle managers and first-line managers, employees of manufacturing enterprises. Total number of questionnaire is 400, withdrew number is 320, number of invalid questionnaire is 53, the number of final valid questionnaire is 267, valid rate of questionnaire is 66.75%.

B. Scale reliability and validity test

This study uses SPSS17.0 software to carry out reliability test on scales and variables, the results are shown in table 1, cronbach’s α of variables are all higher than standard value of 0.7, corrected item-total correlation (CITC) of variables are higher than standard value of 0.5, cronbach’s Alpha if item deleted (CAIID) of variables are higher than standard value of 0.7, scales have good reliability coefficient. This study uses SPSS17.0 and AMOS 17.0 software to carry out convergent validity scale test, the results are shown in table 1, KMO of variables are higher than standard value of 0.6, Bartlett’s p values are all 0.000, are all less than standard value of 0.001, the ratios of the extracted common factor cumulatively explaining total variance are higher than standard value of 60%, factor loading values are all higher than standard value of 0.6, composite reliability CR of variables are all greater than standard value of 0.6, AVE of variables are all greater than standard value of 0.5, AVE squared root values are all greater than correlation coefficients, all the scales have good convergent validity. AMOS17.0 software is used to carry out distinguishing validity test for scales, the results are shown in table 2. Compared with single factor, the two factors, three factors and four factors and five factor model, six factor model has relatively goodness-of-fit indices of structure equation modeling, , =0.93-0.9, =0.94-0.9, =0.07<0.08, all scales have better distinguishing validity.

C. Empirical analysis process and results

1) The projection pursuit method

Projection pursuit model can deal with complicated nonlinear and non-normal high dimensional date in the low dimensional space by means of reducing the dimension of data, which is a statistical analysis and evaluation method which has the properties of high robustness and accuracy. The main steps of the projection pursuit model are as follows [15-16].

Step1, the normalized values of evaluation indexes, x(i, j) stands for the evaluation index j of sample i (i = 1,2,...,n, j = 1,2,...,p).

Step2, construct the projection index function Q(a). Fuse the p dimension date into the one dimension projection value z(i) of the projection direction a = {a(1), a(2), ..., a(p)}.

\[
z(i) = \sum a(j)x(i, j)\]

\[
Q(a) = SD\]

\[
S = \sqrt{\frac{\sum (z(i) - E(z))^2}{n-1}}\]

\[
D = \sum\sum (R - r(i, j))u(R - r(i, j))\]

Of which, S stands for the Standard deviation of z(i), D stands for the local density of z(i), E(z) stands for mean value of z(i), r stands for the window radius local density, \(r_{max} = \frac{P}{2} \leq R \leq 2p\), r(i, j) = |z(i) - z(j)|.

Step3, to optimize the projection index function Q(a). By using real-code accelerating genetic algorithm to solve nonlinear
according to the sample value, analysis of the pros and cons of each variable.

Firstly, solve the Cusp catastrophe model differences of the potential function of \( y \) into the formula of (1) for the projection of each sample value, analysis of the pros and cons of each variable according to (16) and achieve the maximization of \( Q(a) \) and the optimization of the best projection direction of \( a(j) \).

\[
\max Q(a) = S_D \quad \text{s.t. } \sum_{j=1}^{n} a(j) = 1
\]

Fuse (11) into (12), get difference equations of cusp catastrophe.

The derivative of the function
\[
f(y) = y^2 + ay + by + c
\]
for within the equilibrium surface,
\[
\frac{dy}{dx} = 5y^2 + 3ay + 2by + c = 0
\]  
(14)

The singularity set is
\[
\frac{dy}{dx} = 12y^2 + 2a = 0
\]  
(11)

Combine (10) with (11), this study obtains,
\[
y = -\frac{3b}{4a}
\]  
(12)

Secondly, solve the swallowtail bifurcation equation [17-20].

The derivative of the function
\[
f(y) = y^3 + ay^2 + by + cy
\]
for within the equilibrium surface,
\[
\frac{dy}{dx} = 6y^2 + 4ay + 3by + 2cy + d = 0
\]  
(16)

The singularity set is
\[
\frac{dy}{dx} = 30y^2 + 12ay^2 + 6by + 2c = 0
\]  
(17)

Combine (14) with (15), this study has swallowtail catastrophe bifurcation equation decomposition form.

Thirdly, solve the butterfly catastrophe model bifurcation equation [17-20].

The derivative of the function
\[
f(y) = y^4 + ay^3 + by^2 + cy^2 + dy
\]
for within the equilibrium surface,
\[
\frac{dy}{dx} = 20y^3 + 6ay^2 + 2b = 0
\]  
(15)

Combine (16) with (17), obtain butterfly catastrophe bifurcation equation decomposition form.

Use the normalized formula to conduct the comprehensive evaluation of the evaluation object [17-20].

### TABLE I  TABLE TYPE STYLES

<table>
<thead>
<tr>
<th>variables</th>
<th>Cronbach’s a</th>
<th>CITC</th>
<th>CAID</th>
<th>KMO</th>
<th>Explained cumulative rate</th>
<th>Factor loading</th>
<th>CR</th>
<th>AVE</th>
<th>relationships</th>
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</thead>
<tbody>
<tr>
<td>SE</td>
<td>(0.7,1)</td>
<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
<tr>
<td>IIP</td>
<td>(0.7,1)</td>
<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
<tr>
<td>OQM</td>
<td>(0.7,1)</td>
<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
<tr>
<td>OQF</td>
<td>(0.7,1)</td>
<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
<tr>
<td>OQNE</td>
<td>(0.7,1)</td>
<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
<tr>
<td>OQ</td>
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<td>(0.5,1)</td>
<td>(0.7,1)</td>
<td>(0.6,1)</td>
<td>(60%,1)</td>
<td>(0.6,1)</td>
<td>(0.6,1)</td>
<td>(0.5,1)</td>
<td>greater</td>
</tr>
</tbody>
</table>

### TABLE II  DISTINGUISHING VALIDITY TEST RESULTS FOR SCALES

<table>
<thead>
<tr>
<th>comparative test group</th>
<th>( \chi^2/df )</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>single factor</td>
<td>19.82</td>
<td>0.56</td>
<td>0.58</td>
<td>0.18</td>
</tr>
<tr>
<td>two factors</td>
<td>16.28</td>
<td>0.61</td>
<td>0.65</td>
<td>0.16</td>
</tr>
<tr>
<td>three factors</td>
<td>11.46</td>
<td>0.72</td>
<td>0.76</td>
<td>0.12</td>
</tr>
<tr>
<td>four factors</td>
<td>5.32</td>
<td>0.85</td>
<td>0.88</td>
<td>0.09</td>
</tr>
<tr>
<td>five factors</td>
<td>3.87</td>
<td>0.91</td>
<td>0.92</td>
<td>0.08</td>
</tr>
<tr>
<td>six factors</td>
<td>2.89</td>
<td>0.93</td>
<td>0.94</td>
<td>0.07</td>
</tr>
</tbody>
</table>

2)  *Catastrophe progression method*

Catastrophe progression method comprises the following steps: index dimensionless, a hierarchical structure model, established the index system of evaluation of mutation model, to evaluate the assessment object using the normalized formula [17-20]. Variables in catastrophe progression model consist of state variables and control variables. Mutation model commonly used include the cusp catastrophe model, swallowtail catastrophe model and the butterfly catastrophe model [17-20].

The derivative of the function
\[
f(y) = y^4 + ay^3 + by^2 + cy^2 + dy
\]
for within the equilibrium surface.


\[ y_a = a^1/2 \]
\[ y_b = b^{1/3} \]
\[ y_c = c^{1/4} \]

Normalized formula for Swallowtail model,
\[ y_a = a^{1/2}, \; y_b = b^{1/3}, \; y_c = c^{1/4} \]

Of which, \( y_a, \; y_b, \; y_c \) significantly, SE (Beta coefficients=0.194, p>0.05) and IIP (Beta coefficients=0.343, p<0.001) are all conductive to OQF (Beta coefficients=0.358, p<0.001) and IIP (Beta coefficients=0.296, p<0.01) are all conductive to OQM significantly, SE (Beta coefficients=0.304, p<0.01) and IIP (Beta coefficients=0.381, p<0.01) are all conductive to OH significantly (Beta coefficients=0.364, p<0.001), IIP is conductive to OH significantly (Beta coefficients=0.293, p<0.01). Table 6 also reveals that SE (Beta coefficients=0.156, p>0.05) and IIP (Beta coefficients=0.148, p>0.05) are still not all conductive to OQME significantly.

### IV. Conclusion

This study uses projection pursuit method, catastrophe progression method and structure equation modeling method to empirically analyze relationships among prerequisite variables (organizational self-esteem of employees and insider identity perception of employees), organizational quality specific immunity and organizational health. In summary, combining with SEM results, organizational quality monitoring are partially mediating variables of relationships among organizational self-esteem of employees, insider identity perception of employees and organizational health, organizational quality defense are partially mediating variables of relationships among organizational self-esteem of employees, insider identity perception of employees and organizational health, organizational quality memory are not mediating variables of relationships among organizational self-esteem of employees, insider identity perception of employees and organizational quality.
organizational health. Organizational self-esteem of employees, insider identity perception of employees are all significantly conductive to organizational health. Organizational quality monitoring, organizational quality defense and organizational quality memory are all significantly conductive to organizational health. Throughout the domestic and foreign research results, literatures about relationships among prerequisite variables, organizational quality specific immune and organizational health are relatively fewer. The empirical analysis results will provide theoretical and practical guidelines for fostering organizational quality specific immune and enhancing organizational health.

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