Empirical Research on the Effects of Organizational Innovation on Organizational Performance—based on mediator effect of dynamic core competence of enterprise

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Abstract

A theoretical framework model that researches the interrelationship of organizational innovation, organizational performance and dynamic core competence of enterprise (DCCE) is proposed on the foundation of the analysis of measure dimensions which include four oriented organizational innovations and the four sub-core capabilities of DCCE and the three levels of variables of performance. By using survey questionnaire and in-depth interviews in 45 high-tech enterprises, empirical study is carried on applying structural equation modeling (SEM) to analyze the influencing path and the fit degrees. The results show that organizational innovation and organizational performance have significant, direct, and positive impacts. Some managerial implications are proposed about adopting the relationship to promote the successful implementation of innovation for the enterprise.

Keywords: Organizational Innovation, Organizational Performance, Dynamic Core Competence of Enterprise, SEM

As the knowledge-based economy draws to a close, the pace of economic integration has increased dramatically. In the face of intensifying competition, theorists and business people were forced to re-examine the practical problem with dynamic point of view. In order to maintain their long-term competitive advantage, enterprises were forced to adapt, update, reconfigure and create their resources and capabilities, to conform to changes in the environment constantly [1]. In this context, with the further intensified dynamic, complex and uncertain business environment, the only way for a firm to sustain a competitive advantage and to adapt to the new demands of the times is to spare no effort to implement business innovation and change. A stream of studies have shown that organizational innovation played an important role in promoting organizational performance, innovation can greatly enhance management efficiency, increasing market share, increasing profit margins [2]. However, research has also pointed out that organizational innovation has no effect or little effect on performance. Level of innovation among enterprises of different performance levels is not significantly different [3]. Business living by imitating others is not significantly lower than the performance achieved by enterprises with a high level of innovation [4]. In view of this, researcher initiates to check if there are intermediary (or adjust) variables, By which organizational innovation can have effect on performance.

1. Variables and their measurement

1.1. Define the elements of organizational innovation

Guo Tao believes that Organizational innovation is the organization's managers and other members' interactions on the internal mechanism of each system or organization and external adjustment mechanism of interaction between the environment, development and improvement of the process in
order to adapt to changes in the external environment or to meet the needs of the organization's own internal growth [5]. The content of organizational innovation can be summarized in three dimensions: individual level of organizational innovation, and team level, organizational level of organizational innovation. Due to space issues, this study is limited to reasearch the level of organization of organizational innovation on organizational performance only. Elements of organizational innovation of the organizational level include structure-oriented organizational innovation, knowledge-oriented organizational innovation, culture-oriented organizational innovation and strategy-oriented organizational innovation.

### 1.2. Dynamic core competencies (DCCE)

Teece presented the concept of dynamic competence which is competence of enterprise integration, and competence of building and restructuring of internal and external enterprises to adapt to the rapidly changing environment in 1994 [6]; Eisenhardt and Martin (2001) [7], Griffith and Harvey (2001), Helfat and Peteraf(2003) [8], respectively analyzed the dynamic capabilities from the point of enterprise-wide strategic management, processes and practices, organizational learning and knowledge management. Teece (1997, 2007) mentioned three aspects of perception of the environment, learning ability and the ability to configure [9]. Yang shuili et (2009) proposed to evaluate dynamic competence via four dimensions of demand forecasting, technological innovation, flexible manufacturing capability and capability of resources configuration [10]. Based on related research and analysis, enterprise dynamic core competence is evaluated by most of researchers via 4 key dimensions of assessment capacity, configuration capacity, learning ability and technological innovation ability. With the dynamic change of external environment and diversification of domestic demand, focusing on generation and nurturing of the four flexible core competencies enable enterprises to overcome the problem of rigidity of core competencies, and to help enhance the overall level of competence, as the specific description shown in Figure 1.

![Schematic Diagram of how to Enhance the Ability](image)

**Figure 1.** Schematic Diagram of how to Enhance the Ability

### 1.3. Organizational performance

In general, organizational performance is referred to the performance and efficiency of activities engaged in, that is, the achievement of organization’s strategic goals, which includes the efficiency and results of activities and so on (Kast 1979). As enterprise’s resource and capacity advantages ultimately reflected in its organizational performance, therefore, through the analysis of the organizational performance can further verify whether its own resources and capabilities are really valuable. You can use many of the indicators to measure the organizational performance, this study focuses on enterprise organizational performance in a dynamic environment. These organizational performances mainly
related to the dynamic competence of enterprises, mainly take the “growth”, “profit” and “sustainability” three competitive advantages compared to the same industry as the dimensions of organizational performance evaluation, these three advantages reflect the organizational performance in the changing environment, can be better adapted to the subject of this study [11]. Growth is the company's growth rate and level of development; profitability refers to the ability of enterprises to make profits. Some companies grow rapidly, but at the expense of profits; business sustainability is the ability of stable development which manifested by the volatility of previous performance and the trends of future performance.

2. Theoretical mode build up and assumptions research

2.1. Relationship btw organizational innovation and organization performance

Organization innovation becomes more and more important in the intense and uncertain competition environment. Innovation not only can ensure considerable high vitality and adaptive capability, but also, helps a lot on organization performance improvement. Yamin&Mavando(1999) spotted remarkable relationship between organization innovation(which includes managerial innovation, technology innovation and product innovation) and performance while discussing the relationship btw innovation index and performance[12]. Meanwhile, after studied a large number of cases on relationship between innovation and performance based on different industry characteristics, many researchers believe that organization innovation can lead to better performance in whatever industry. Based on above analysis, following assumption is proposed according to research on affect relation btw innovation and performance in four aspects of organization level:

H1: organization innovation has direct positive effect on organization performance

2.2. Relationship btw organization innovation and dynamic core competence

As a important part of enterprise innovation activity ,organization innovation has significant affect on enterprise dynamic core competence, suitable strategy-oriented organization innovation activity will provide good operation environment for enterprise dynamic core competence and also will be helpful for cultivating various internal core competence of enterprise;structure-oriented organization innovation is innovation actions of enterprise which are implemented in the structure-oriented way and measured by decision-making speed and information flow result, has direct influence on speed of decision-making, information flow and enterprise competence of learning and technology innovation accordingly. Culture-oriented organization innovation which is cored by entrepreneurial mentality has significant effect on improving and cultivating employee competence of learning and technology innovation by improving involving in decision-making, sharing power, supporting , cooperating and individual career developing ;Knowledge-oriented organization innovation is the process of gaining and sharing information internally, information include customer requirement, market changes, competitor behavior and develop trend of new technology. Knowledge-oriented organization innovation has direct effect on strengthening assessment and learning competence of enterprise and properly applying distributing competence

Based on above analysis, following assumption is proposed:

H2: organization innovation has direct positive effect on dynamic core competence

2.3 Relationship btw dynamic core competence and organization performance

Using computer simulation ,Zott(2003)found out the direct and indirect relationship btw dynamic core competence and organization performance,Menguc & Barker(2005)also found out that dynamic core competence has positive effect on sales performance and can improve the market return rate of enterprise share.Zhangtao(2010),Lin jiali(2009),Zeng ping(2008),Jiao hao(2008),Qin dong(2010),these researchers all believe that the organization competence have a positive impact on organizational performance[13].Based on above article study, below assumption is proposed:

H3: dynamic core competence has direct positive effect on organization performance
2.4. Relationship btw organization innovation, dynamic core competence and organization performance

In the dynamic environment, the original core competence can not guarantee continues long term advantage, that is why enterprise should keep increasing creating new competence, and innovation is main resource of knowledge creation and technology distribution, So, organization innovation is important approach for increase the enterprise competence, and also it is strong guarantee on maintaining core competence which is unique, irreplaceable and unable to imitate. Meanwhile, by increasing and cultivating dynamic core competence, high barrier in the industry can be established and low level price competition will be avoided and also irreplaceable customer value creating competence can be strengthened. In that way, enterprise will gain continuous long-term profit and will strengthen advantages in the competition. Therefore, dynamic core competence may have regulation effect btw organization innovation and performance. Based on this, follow assumption is proposed: 

H4: dynamic core competence has adjustment effect btw organization innovation and performance. 

Theoretical mode is proposed based on above individual analysis and relationship research among organization innovation, dynamic core competence and measurement of organization performance. See figure 2.

3. Data sources and the validity

3.1. Research samples

The empirical data for the research mainly comes from sampling method, including survey questionnaire and interviews about important enterprises. The main part of the research is decided through the pre-testing and the in-depth interviews before the formal survey. Research enterprise samples focus on high-tech enterprises and related research institutes in Beijing, including spacecraft and aircraft manufacturing, electronic and telecommunications equipment manufacturing, computers and office equipment manufacturing, medical and pharmaceutical equipment manufacturing and instruments and meters manufacturing industries. The research intends to observe and study several aspects of organizational performance such as the growth rate and degree, profitability and stable development degree, there are 45 high-tech enterprises selected with over 3 years establishment. In formal valid samples, the proportion of men to women, and the proportion of basic level, middle level and high level administrative staff are taken into consideration. The establishment time of surveyed
enterprises shows normal distribution, and enterprises with more than 2000 staff account for a large proportion which is about 35 percent. In consideration of the understanding of survey questionnaire, all samples’ educational backgrounds are above vocational degrees, interviewees with middle and high-level position in enterprises account for 68.7 percent, 91 percent of interviewees have academic degree above bachelor’s, 70 percent of interviewees are over 30-year old, 92.6 percent of interviewees have served more than 3 years in present enterprises. These largely guarantee the authenticity, reliability and validity of the survey questionnaire. All of the selected variables were measured on 5-point Linker type scales (where 1=none, 5=high). The questionnaire was mailed to 350 administrative staff and 276 responses were received. There are 261 effective questionnaires after eliminating mistaken and inaccurate responses.

3.2. Reliability and validity analysis

Reliability analysis is used to appraise the stability and reliability of the questionnaire\[14\]. In statistics, homogeneity reliability is generally applied to the evaluation of reliability coefficient. Homogeneity reliability is also called inner consistency, which denotes consistency of all the inner items in test. Cronbach’s Alpha is commonly used, the formula is:

$$\alpha = \frac{k}{k-1} (1 - \frac{\sum S_i^2}{S_x^2})$$

In the formula, K stands for the number of questions in questionnaire, $S_i^2$ is the variation value of a question, $S_x^2$ stands for the total variation value of the questionnaire. Cronbach’s $\alpha$ coefficient above 0.70 is generally considered as high reliability\[15\]. Cronbach’s $\alpha$ coefficient is used to test reliability of variables, results are showed in Table 1. The Cronbach’s $\alpha$ coefficient is above 0.70 of all the variables in the questionnaire\[16\]. Hence, all the selected variables have high consistency and stability, the quality of data has reliability.

Table 1. Cronbach’s $\alpha$ coefficient

<table>
<thead>
<tr>
<th>Variable</th>
<th>factor</th>
<th>Value of Cronbach’s $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>organizational innovation</strong></td>
<td>strategy-oriented</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>structure-oriented</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>knowledge-oriented</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>culture-oriented</td>
<td>0.81</td>
</tr>
<tr>
<td><strong>dynamic core competence</strong></td>
<td>assessment capacity</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>learning capability</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>technological innovation capability</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>configuration capacity</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>Organizational Performance</strong></td>
<td>growth</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>profitability</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>0.86</td>
</tr>
</tbody>
</table>

With regarding to validity, this study examines from two aspects: in content validity, all of the items in questionnaire entirely come from variables in previous references. Many scholars have used these previous variables and achieved favorable results. The questionnaire is revised through pre-testing and consultation with experts in related areas before confirmation of items, which ensure favorable content validity of questionnaire; in structure validity, factor analysis is conducted on formal questionnaires by using SPSS16.0 software. The results show that factor loadings values of all items are above 0.65, which demonstrate favorable structure validity of this questionnaire.

4. Fitting analysis and results discussion

SPSS16.0 and AMOS7.0 statistical softwares are used to analyze and examine variable relationships based on the data collected. Structural equation modeling is a statistical method to examine theoretical model based on empirical data, including measurement model and structural model, and it combines with two statistical techniques, factor and path analyses. This multiple statistical analysis considers and
processes multiple dependent variables simultaneously while allowing dependent and independent variables to have certain measurement error. Ken card-type factor analysis in measurement model can provide strict examination and explanation of the consistency of factors through reliability and validity. The structural model can analyze the relationships among multiple exogenous and endogenous variables simultaneously; structural equation model can analyze fitting level of theoretical model. It is one of the most important emerging statistical methods in quantitative study of today’s social science.

LISREL is applied to ken card-type factor analysis. Covariance and maximum likelihood method are used as evaluation tools to examine rationality of measurement dimensions of organizational innovation, dynamic core competence and organizational performance. Maximum likelihood method is used to estimate the parameters of model. With regard to analyzing the fit of the survey data and the theoretical model, the indexes mainly contain NNFI (Non-normed fit index), CFI (Comparative fit index), RMSEA (Root mean square error of approximation), \( \chi^2 / df \) and GFI (Goodness of fit index). \( \chi^2 / df = 2(N - 1) \times F / (p + q)(p + q - 1) - 2t \) and GFI = \( \frac{\sum_{i=1}^{q} \{ S \sum_{j=1}^{r} (q) \} + tr(S \sum^{-1} (q)) \} \cdot \log |S| \cdot (p + q) \). P is the number of observation variable Y, q is the number of observation variable X, S is the variable number \( X \) and \( Y \)’s \( p \times q \)-step variance being common variable matrix, N is the sample number, t is the total number of Parameters estimated, \( \chi^2 \) represents the probability ratio Chi-square value. \( \chi^2 \) is the \( \chi^2 \) value of the datum line model, \( \chi^2_{m} \) is the \( \chi^2 \) value of the theoretical model. \( df_l \) is the degree of freedom of the datum line model, \( df_m \) is the degree of freedom of the theoretical model. The logical range of GFI is from 0 to 1. 0 represents a bad fit and 1 represents a good fit. Scholars commonly suggest values of NNFI and CFI above 0.80 represent a good fit. The theoretical model can be accepted when the GFI is more than 0.9. The recommended maximum value is 0.10. The theoretical model will be accepted when the RMSEA ≤0.05 and explained “preferable fit”. The theoretical model will be explained “well fit” when the value of RMSEA is between 0.05 to 0.08, 0.08 to 0.10 means “general fit”, and more than 0.01 means “bad fit”. The \( \chi^2 / df \) ratio provides a rough estimate of the statistical fit of the model versus the number of parameters estimated, the \( \chi^2 / df \) ratio below two represents acceptable fit degree. The results are showed in Table 2. The measurement model has a good model-to-data fit, and the estimated values have no significant correlation, standard loads, standard deviations and path coefficients are all above 0.5 and below 1.0, which evidently shows that all indices reach acceptable level. Therefore, the measurement dimensions in figure 2 are designed rationally and desirably reflect the condition of variables.

Table 2. Ken card-type factor analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>NNFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>( \chi^2 / df )</th>
<th>GFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>organizational innovation</td>
<td>0.823</td>
<td>0.836</td>
<td>0.064</td>
<td>1.578</td>
<td>0.921</td>
</tr>
<tr>
<td>dynamic core competence</td>
<td>0.842</td>
<td>0.889</td>
<td>0.045</td>
<td>1.458</td>
<td>0.935</td>
</tr>
<tr>
<td>organizational performance</td>
<td>0.863</td>
<td>0.828</td>
<td>0.058</td>
<td>1.364</td>
<td>0.917</td>
</tr>
</tbody>
</table>

On the basis of establishment of measurement model, further estimate is carried on structural model by utilizing LISREL. The influence relations among three models of organizational innovation, dynamic core competence and organizational performance are discussed. The results of the estimation of fit indices show the structural equation model has preferable model-to-data fit(NNFI = 0.853, CFI = 0.869, RMSEA = 0.054, \( \chi^2 / df = 1.643, GFI = 0.934 \)), the estimated values have no significant correlation, standard loads, standard deviations and path coefficients are all above 0.5 and below 1.0. The results of path analysis are showed in figure 3.

There are three significant paths. The first path is: organizational innovation has a direct influence on organizational performance; its path coefficient is 0.076. The second path is: organizational
innovation has a direct influence on dynamic core competence of enterprise; its path coefficient is 0.734. The third path is organizational innovation has an indirect influence on organizational performance though dynamic core competence, its indirect influence coefficient is 0.528 and p<0.01; consequently, the total influence coefficient of organizational innovation on organizational performance is 0.604. The results are showed in table 3.

Table 3. Path coefficients of theoretical models and hypothesis estimate

<table>
<thead>
<tr>
<th>Relation of Variables</th>
<th>Path Coefficients</th>
<th>Corresponding Hypothesis</th>
<th>Estimate Results</th>
<th>Value of P</th>
</tr>
</thead>
<tbody>
<tr>
<td>organizational innovation → organizational performance</td>
<td>0.076***</td>
<td>H1</td>
<td>prove</td>
<td>0.000</td>
</tr>
<tr>
<td>organizational innovation → dynamic core competence</td>
<td>0.719***</td>
<td>H2</td>
<td>prove</td>
<td>0.000</td>
</tr>
<tr>
<td>dynamic core competence → organizational performance</td>
<td>0.734***</td>
<td>H3</td>
<td>prove</td>
<td>0.000</td>
</tr>
<tr>
<td>organizational innovation → organizational performance</td>
<td>0.528***</td>
<td>H4</td>
<td>prove</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*** indicates p<0.01; path coefficients are standardized

The research above demonstrates that the hypotheses of H1, H2, H3 and H4 are all proved.

5. Conclusion

Aim of this article is to discuss the inter-relationship among organization innovation, dynamic core competence and organization performance. Studying on high-tech enterprise, the theoretical model of organization innovation’s effect on core competence of enterprise is demonstrated via using structural functional model and investigated data. It is showed that organization innovation and dynamic core competence have significant effect on organization performance, and following conclusions are raised: 1 organization innovation has significant direct effect on dynamic core competence; 2 organization dynamic core competences have positive effect on organization performance. 3 organization innovations has weaker positive effect on organization performance, further more, innovation has effect on organization performance mainly via dynamic core competence. Survival and development of enterprise depends on accumulation of inner innovation. Therefore, establishing organization
innovation and dynamic core competence should be highlighted in the enterprise management, in that way, enterprise's competitive ability can be established and increased, in the end, thanks to the organization innovation and dynamic core competence, organization performance can be improved. Based on above conclusions, organization performance can not be improved without organization innovation and dynamic core competence. We would like to suggest enterprise not only highlight the innovation, but also highlight the cultivating and increasing of the dynamic core competence. We also would like to suggest improving performance via actively utilizing dynamic core competence’s effect of increasing the positive effect of organization innovation. Although important conclusions on strategic management implement have been risen for some high-tech enterprises, further improvement is needed, for instance, inter-relationship among innovation, dynamic core competence and organization performance are discussed based on high-tech enterprise ignoring the effect of different industries. Discussion can be done based on wider industry range in the future.

6. References


