



RESEARCH ON THE IMPACT OF FIRM'S INNOVATION - DRIVEN ON NEW PRODUCT INNOVATION PERFORMANCE

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ABSTRACT

The framework of this research is based on the discovery in the clues of former researches that Innovation-driven is the pre factor for the firm to grow up or to gain the competitive advantage, and among them, innovation comes mainly from market pull and technology push (DOSI,1998). The study taking market orientation and technological opportunity as innovation-driven factors, which are two major determinant factors for the firm's gaining the competitive advantage and improving the performance and profits. Based on knowledge-based theory, a questionnaire survey of 335 high-tech and Internet firms in China was conducted to empirically analyze the relationship between innovation-driven, absorptive capacity, and new product innovation performance. The article found that: the absorptive capacity mediates the relationship between innovation-driven and new product performance, and market turbulence negative adjusts the relationship between market orientation and absorptive capacity. This study emphasizes the importance of the firm's focus on changes in customer needs to pursue the cultivation of their own absorptive capacity. The evidence contributes to the development of innovative literature and knowledge-based theory.



Keywords: Market Orientation; Technological Opportunity; Absorptive Capacity; Market Turbulence; New Product Innovation Performance

1. INTRODUCTION

In the era of knowledge economy, with the market competition becoming gradually more and more intense, firms that facing the dynamic, complicated and highly uncertain competition environment shall take the continuous innovation as the responding strategy for survival and development in order to maintain the advantageous competition capacity Porter (1980). Innovation is indeed the essential method for the development of a firm, an industry or even a country.

Based on the knowledge-based theory, the study attempt to deeply reveal the relationship between innovation-driven and new product innovation performance from the perspective of two Innovation-driven factors, market orientation and technological opportunity.

This study helps firm in catching more accurately the market information and technological information, transforming available knowledge into their own absorptive capacity to improve new product innovation performance to attain competitive advantage, meanwhile, this article has also discussed whether market turbulence will affect the cultivation of firm's absorptive capacity. This article is of a comparatively essential significance both in theoretically and practically.

2. LITERATURE REVIEW

Innovation-driven refers to the collection of a series of constraints that driven by internal and external factors, obtains a desire and requirements for innovation, so as to carry out innovation activities. According to the famous paradigm, market pull and technology push are main factors to promote firm innovation (DOSI, 1988).

Herein, this article mainly takes the market orientation and technological opportunity as the two main driving factors for the promotion of firm innovation performance and obtainment of competitive advantage. At the same time, because of the importance of innovation to the firm profit, it is more and more concerned by the scholars and entrepreneurs to evaluate whether the firm can achieve the expected and achieve certain performance under the driving factors of innovation.



2.1. Market Orientation, Absorptive Capacity and New Product Innovation Performance

The main difference between a firm and its competitors comes from knowledge resources (GRANT, 1996). Knowledge resource refers to the internal ability of the firm to be creative, unique, difficult to imitate, and the market knowledge is the most important above all (LUCA; ATUAHENE-GIMA, 2007). Market orientation plays an important role in a firm's ability to generate, disseminate and use better information about its customers and competitors (KOHLI; JAWORSKI, 1990).

Grant (1996) proposed that knowledge is very important, but knowledge is not important in knowledge itself, but the mechanism of knowledge integration, indicating that knowledge integration is the source of competitive advantage. When a firm comes into contact with knowledge, it will influence the decision making of the firm (MARCH; SIMON, 1993) and the development of the future ability (MCGRATH; MACMILLAN, 1995).

The more market knowledge the firm has, the more it tends to assimilate the related information, the more it would need to develop the ability of knowledge acquisition, absorption, digestion and application, which is the absorptive capacity, which is necessary for the firm to improve long-term performance (Day, 1994).

The firm of high market orientation will have more market knowledge concerning customers and competitors; in this case, the external market knowledge the firm acquired will vary in the amount of information, information channels and the degree of difficulty, thus the firm and firm members are easier to obtain more external relevant information (CASTRO, 2015).

Meanwhile, the firm with more knowledge of the market will lead to more willingness of the team members to transform market information into useful knowledge to achieve the goals of the organization, and to explore these knowledge to meet the requirements of the market.

Therefore, firms of high market orientation will encourage itself and its employees to develop the ability of acquisition, assimilation, transformation and exploitation of knowledge to external market. Therefore, the higher the market orientation is, the more information the firm gets, which makes the firm to produce absorptive capacity, to conduct the digestion, absorption and application of the

obtained knowledge, and the conversion of valuable knowledge into performance. Based on the above discussion, the first hypothesis of this article as follows:

- H1: Absorptive capacity mediates the relationship between market orientation and new product innovation performance.

2.2. Technological Opportunity, Absorptive Capacity and New Product Innovation Performance

A firm who is eager to has competitive advantage within the industry not only needs to have rare and valuable resources, but also needs the integration mechanism within the firm to conduct the knowledge assimilation, transformation and application to provide new products and services for the customer, and then to gain a competitive advantage (BARNEY, 1991; GRANT, 1996; TEECE, 2007). Technological opportunity is another important driving factor in this article.

The firm has the ability to perceive the technology development and respond accordingly, which can improve the competitive advantage of firm (SRINIVASAN; LILIEN; RANGASWAMY, 2002). With more technology choices, firms have more opportunity to obtain competitive advantage through technological innovation. More technological opportunity means more external information and obtainable external technological knowledge, and the emergence of new technologies opens the door for product innovation. The learning environment being more challenging can increase R & D investment to cultivate the absorptive capacity of the firm.

The stronger the absorptive capacity that the firm has, the more technological information it can collect. Dissemination of information and response to market demand are conducted, and the new product development performance gets higher. Thus, the whole firm innovation performance gets also higher (LICHTENTHALER, 2009). Therefore, this article proposes the second hypothesis as follows:

- H2: Absorptive capacity mediates the relationship between technological opportunity and new product innovation performance.

2.3. The Moderating Effect of Market Turbulence on the Relationship between Market Orientation and Absorptive Capacity

Market turbulence means the extent to which the composition and preferences of an organization's customers tended to change over time

(JAWORSKI; KOHLI, 1993; OLSON; SLATER; HULT, 2005; SANTOS-VIJANDE; ÁLVAREZ-GONZÁLEZ, 2007). A turbulent market is characterized by frequent and unpredictable changes in product preferences and customer needs, in product and production technologies, and in the competitive landscape (ATUAHENE-GIMA; LI; DE LUCA, 2006).

In a turbulent environment with changing consumer preferences, the market will reflect a large number of consumers and competitors' information, firms with high market orientation will obtain the rich market knowledge concerning consumer and competitor.

Volatile market environment will encourage firms to strengthen reserves and effective use of market knowledge, and promote firms to transform market information quickly into the available knowledge for the firm. It improves the firm's ability in acquiring, understanding, assimilating external information and effective use of knowledge, so as to create favorable conditions for firms in the turbulent environment to achieved excellent performance.

The fierce competition will also encourage firms to strengthen the attention to competitors and at the same time, continue to reflect their own way of operation, which strengthens the digestion and absorption of external information and knowledge, and makes the preparation to improve firm performance (JAWORSKI; KOHLI, 1993; OLSON *et al.*, 2005; SANTOS-VIJANDE; ÁLVAREZ-GONZÁLEZ, 2007).

With high market turbulence, the constantly changing customer preferences will make the firm of high market orientation grasp competitors or customers' potential demand now or in the future, which encourage firms to improve digestion tendency of market information and filter, transform customer and competitor information into valuable knowledge.

The combination of high market linkage and high market turbulence can enhance the performance of new product development (CHEN; WANG; HUANG; SHEN, 2016). On the contrary, with low market turbulence, customer preferences will not change frequently, even with high market orientation, the team members will think the customer demand is the same or similar and it will reduce the members' motivation to digest the information. Even it is digested, the firm cannot turn market

information into useful knowledge, and new product innovation performance will thus be relatively low. Therefore, this article proposes the third hypothesis as follows:

- H3: Market turbulence has a positive moderating effect on the relationship between market orientation and absorptive capacity.

2.4. The Moderating Effect of Market Turbulence on the Relationship between Technological Opportunity and Absorptive Capacity

In turbulent environment, it is not enough to respond to the technology and market development from the internal environment and the firm shall actively obtain the external information (CASSIMAN; VEUGELERS, 2006). One of the key factors for the success of firm in a turbulent environment is the ability of acquisition, assimilation, transformation, application of external knowledge. While in a stable environment, the need for firm's external knowledge acquisition and knowledge of the market demand rate has declined (ZAHRA; GEORGE, 2002). Therefore, this article argues that market turbulence will affect the relationship between technological opportunity and absorptive capacity.

Market turbulence reflects the change of degree of customer preference in the industry (JAWORSKI; KOHLI, 1993; OLSON *et al.*, 2005), which is a key source of environmental uncertainty. High market turbulence is characterized by customer's seeking for new products or services and changing the consumption preferences (JAWORSKI; KOHLI, 1993), and that consumer demand is also relatively broad (SANTOS-VIJANDE; ÁLVAREZ-GONZÁLEZ, 2007).

In order to make a profit, the firm must create value for the customer; understand the customer's needs through the detection and data analysis of the industry environment. Technological opportunity is opportunity for managers to perceive the amount of external relevant technical knowledge and to continually increase R & D investment associated with the technology. Firm R & D investment can not only generate new knowledge, but also help to improve absorptive capacity, and thus create innovation and access to competitive advantage.

With high market turbulence, customer preferences often change, and more technological opportunity exist, which encourages the firm to recognize competitors or customers' demand and behavior now or in the future, to predict the development trend of the industry, to seize the opportunity, and promote the firm's filtering,



digestion, and transformation of information related to technology into useful knowledge, and to cultivate technological advantages of the firm, technical knowledge not only refers to the knowledge related to technological progress, but the information of competitors is the source of technical knowledge (TÖDTLING; LEHNER; KAUFMANN, 2009).

With low market turbulence, customer preferences do not change often, and demand response is not obvious. At this time, even if the firm has the technological opportunity, without the user's demand, firms have no motivation to digest the information and cultivation of the absorptive capacity is low. The changing customer demand encourages firms to rely on innovation to continuously modify their products or services to adjust the operation plan. In low market turbulence, no corresponding measures to innovate will be conducted, so new product innovation opportunities are also less. Based on the above discussion, this article puts forward the fourth hypothesis as follows:

- H4: Market turbulence has a positive moderating effect on the relationship between technological opportunity and absorptive capacity. The research framework is shown in Figure 1.

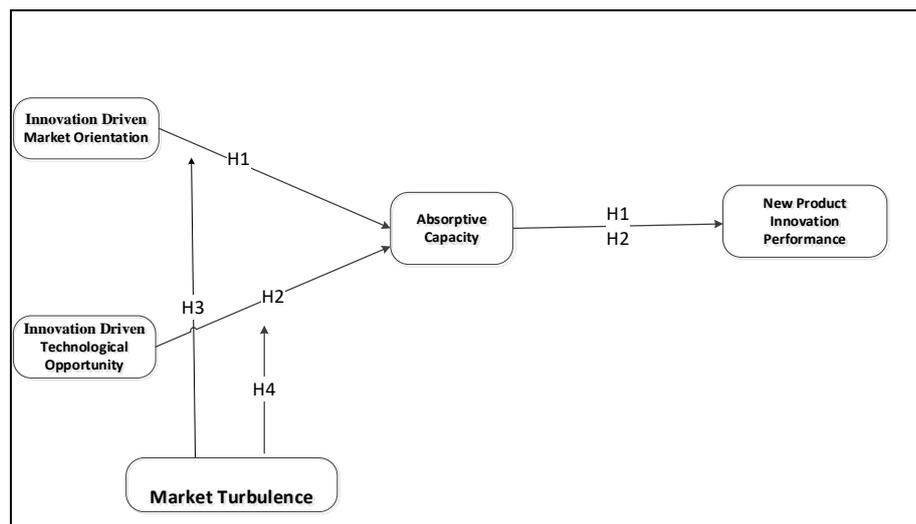


Figure1. Research Framework

3. RESEARCH METHODOLOGY

3.1. Samples and Data Collection

This dissertation focuses on the relationship between innovation-driven, absorptive capacity and new product innovation performance. We followed the

suggestions from earlier studies conducted in new product innovation (ATUAHENE-GIMA; WEI, 2011; LUCA; ATUAHENE-GIMA, 2007). Firstly, this article will focus on the high-technology industry, because the rewards of new products appear more spectacular in the hi-tech sector (SONG; PARRY, 1997). Secondly, this article will focus on internet industry, because in recent years, the scale of China's internet transactions has maintained a rapid growth rate.

Sampling in China should focus on those industries or geographical areas that most suitable to the research (ZHAO; FLYNN; ROTH, 2006), because the capacity and achievement in high-tech industries is much stronger in major cities of China (YAM; GUAN; PUN; TANG, 2004). Beijing, Shenzhen and Shandong province are important for high-tech industry or internet firm, and the sample selection is similar to that used in other studies (ATUAHENE-GIMA; WEI, 2011; YUAN; CHEN, 2015), from May 2016 to March 2017, a total of 650 questionnaires were distributed, 355 questionnaires were returned, and a total of 335 valid questionnaires were obtained after removing invalid questionnaire. The recovery rate and the valid recovery rate of questionnaires were 55% and 52%. The basic characteristics of the sample are shown in Table 1.

Table 1: Sample Discription

| | | | | | |
|-------|-------------------|-----|----------|-------------------------|-----|
| Scale | Below 100 persons | 14% | Stage | Founding period | 11% |
| | 100-500 | 45% | | Growth period | 62% |
| | 500-1000 | 22% | | Mature period | 23% |
| | Above 1000 | 19% | | Recession | 4% |
| Time | Below 1 year | 1% | Business | High-Tech Firms | 65% |
| | 1-5 year | 5% | | Electric business firms | 25% |
| | 5-10 year | 27% | | Manufacturing | 3% |
| | Above 10 year | 67% | | Wholesale and retail | 7% |

3.2. Reliability Test

The Cronbach's α coefficient; AVE, CR, and Factor Loading of each construct were calculated by CFA. Details can be seen in Table 2. Cronbach's α of five variables is between .64 and .81, indicating that the scale has good internal consistency. The CR value of each construct is similar to α , and $CR > 0.7$, so the questionnaire has good internal consistency and satisfies reliability requirements. χ^2/DF is less than 5, NFI, NNFI, CFI, IFI, and RFI all meet the requirement of greater than 0.9, RMR satisfies the requirement of less than 0.1, and SRMR satisfies the requirement of less than 0.08, so the questionnaire satisfies the validity requirement.

3.3. Validity Test

The discriminant validity were verified by Amos and summarized in Table 2.

Table 2: Summary table of correlation coefficients

| | MO | TO | MT | ACAP | NPIP | FA | FS |
|------|---------|---------|---------|---------|------|------|------|
| 1 | 0.53 | | | | | | |
| 2 | 0.32*** | 0.66 | | | | | |
| 3 | 0.28*** | 0.28*** | 0.62 | | | | |
| 4 | 0.65*** | 0.47*** | 0.30*** | 0.65 | | | |
| 5 | 0.47*** | 0.40*** | 0.23*** | 0.63*** | 0.69 | | |
| Mean | 3.98 | 3.90 | 3.79 | 4.08 | 3.98 | 5.31 | 4.09 |
| SD | 0.41 | 0.56 | 0.56 | 0.45 | 0.54 | 18.1 | 1.37 |

Note: N=335 ; * p<.05 ; **p<.01 ; ***p<.001.

The background color numbers indicate the square root of AVG

MO: Market Orientation TO: Technological Opportunity MT: Market Turbulence

ACAP: Absorptive Capacity NPIP: New Product Innovation Performance

FA: Firm Age FS: Firm Scale

4. ANALYSIS AND RESULTS

The paper adopts Hierarchical multiple regression analysis to analyze the mediating role of absorptive capacity and the moderating role of market turbulence by using spss19 and Amos 21.

4.1. Market Orientation, Absorptive Capacity and New Product Innovation Performance

When analyzing the mediation effects of absorptive capacity on market orientation and new product innovation performance, three step regression process will be used to test the mediation role of absorptive capacity (BARON; KENNY, 1986). Meanwhile, three regression models will be established. In model 1, the independent variables are two control variables, firm age, firm scale, as well as market orientation, while the dependent variable is new product innovation performance.

This model aims at discussing the effects of these control variables and market orientation on new product innovation performance. In model 2, the independent variables are two control variables, as well as market orientation, while the dependent variable is absorptive capacity. This model aims at discussing the effects of these control variables and market orientation on the absorptive capacity. In model 3, absorptive capacity is added based on model 1. In other words, model 3

is a full model containing all the control variables, market orientation, and absorptive capacity. Table 3 shows the regression operating results about mediation effects of absorptive capacity on market orientation and new product innovation performance.

Table 3: CFA of Measures

| Measure and Source | Description | Standzrdized Factore Loadings | t Value |
|---|--|-------------------------------------|----------------|
| Market Orientation (Ellis, 2007) AVE=.28 CR=.74 α=.64 | In the development of this new product or service, Please indicate your agreement with each of the following: | | |
| | ● Our objectives are driven by customer satisfaction. | .57 | 9.35 |
| | ● We have a good understanding of how our customers value our products and services. | .56 .46 | 10.27 10.19 |
| | ● Our business strategies are primarily driven by our understanding of possibilities for creating value for customers. | .43 | 9.16 |
| | ● How often do managers visit important customers to learn what products/services they will need in the future? | .26 | 11.18 |
| | ● We know our competitors well. | .48 | 12.44 |
| | ● If a major competitor were to launch an intensive campaign targeted at our customers , we would respond immediately. | .45 | 14.26 |
| | ● How frequently do top managers discuss competitors' strengths and strategies? | .76 | 9.16 |
| | ● How frequently do you take advantage of opportunity to exploit competitors' weaknesses? | | |
| Technological Opportunity (Zahra, 1996) AVE=.43 CR=.78 α=.70 | In the development of this new product or service, Please indicate your agreement with each of the following: | | |
| | ● Opportunities for product innovation are abundant in our major industry. | .60 | 16.24 |
| | ● Opportunities for technological innovation are abundant in our major industry. | .71 .31 | 16.78 13.24 |
| | ● Spending on research and development (R&D) is higher in our major industry than in most industries. | .59 | 11.22 |
| | ● Opportunities for major technological breakthroughs are abundant in our major industry. | .61 | 11.10 |
| | ● The technology in our industry is changing rapidly. | | |
| New Product Innovation Performance (Tsai and Yang, 2013) AVE=.47 CR=.77 α=.66 | Please indicate your agreement with each of the following Statements with respect to description of the new product or service. | | |
| | ● Relative to our principal competitors, our new product innovation performance over the past three years on sales growth rate. | .64 | 13.10 |
| | ● Relative to our principal competitors , our new product innovation performance over the past three years on return on assets. | .68 | 12.37 |
| | ● Relative to our principal competitors , our new product innovation performance over the past three years on market share growth. | .48 | 15.41 |
| | ● Relative to our principal competitors , our new product innovation performance over the past three years on overall performance. | .48 | 16.01 |
| Absorptive Capacity (Iyengar <i>et al.</i> , 2015) AVE=.42 CR=.88 α=.81 | In the development of this new product or service, Please indicate your agreement with each of the following: | | |
| | ● We are successful in learning new things within our office. | .59 | 14.27 |
| | ● Our office is effective in developing new knowledge or insights that have the potential to influence our business. | .59 | 9.80 |
| | ● Our office is able to identify and acquire internal (e.g. within the office) and external (e.g. Market) knowledge. | .52 | 15.41 |
| | ● Our office has effective routines to identify, value, and import new information and knowledge. | .51 | 16.35 |
| | ● Our office has adequate routines to analyze the information and knowledge Obtained. | .53 .61 | 15.52 19.32 |

| | | | |
|--|---|-----|-------|
| | ● Our office has adequate routines to assimilate new information and knowledge. | .56 | 15.52 |
| | ● Our office can successfully integrate our existing knowledge with the new information and knowledge acquired. | .48 | 8.97 |
| | ● Our office is effective in transforming existing information into new knowledge. | .43 | 7.96 |
| | ● Our office can successfully exploit internal and external information and knowledge into concrete applications. | .55 | 8.96 |
| | ● Our office is effective in utilizing knowledge in new services. | | |
| Please indicate your agreement with each of the following statements with respect to your environment: | | | |
| Market Turbulence (Jaworski & Kohli, 1993) AVE=.39 CR=.75 α=.68 | ● In our kind of industry, customers' product preferences change quite a bit over time. | .71 | 12.66 |
| | ● Our customers tend to look for new product all the time. | .67 | 13.93 |
| | ● Sometimes our customers are very price-sensitive, but on other occasions, price is relatively unimportant. | .35 | 10.66 |
| | ● We are witnessing demand for our products and services from customers who never bought them before. | .52 | 17.03 |
| | ● New customers tend to have product-related needs that are different from those of our existing customers. | .47 | 14.60 |

Notes:CR=composite reliability

Table 4: Results for Mediated Regression Analysis

| Variables | Criterion ACAP | | Criterion New Product Innovation Performance | | | |
|-----------------|----------------|----------|--|---------|-----------|----------|
| | Model 2 | | Model 1 | | Model 3 | |
| | β | t value | β | t value | β | t value |
| FA | -.03 | -2.24 | .000 | -.02 | .02 | 1.23 |
| FS | .04 | 2.28 | -.001 | -.03 | -.03 | -1.31 |
| MO | .72 | 15.50*** | .62 | 9.74*** | .14 | 1.84 |
| ACAP | | | | | .68 | 10.28*** |
| F value | 83.60*** | | 31.86*** | | 57.88*** | |
| R ² | 0.431 | | 0.224 | | 0.412 | |
| ΔR ² | | | | | 0.188 | |
| F change | | | | | 105.71*** | |

*p<0.05 **p<0.01 ***p<0.001

Note: This article used a two-tailed test for control variables and a one-tailed test for all hypotheses.

In Model 1, we use regression analysis to test the direct impact of market orientation on new product innovation performance. The results show that market orientation has a significant positive impact on new product innovation performance ($\beta = .62, p < .001$). In addition, Model 2 suggests that market orientation has a positive effect on realistic absorptive capacity ($\beta = .72, p < .001$). Finally, when absorptive capacity was added to Model 3, it showed a positive and significant effect on the innovation performance of new products ($\beta = .68, p < .001$).

It can also be seen from the analysis results that with the addition of absorptive capacity, the influence of market orientation on new product innovation performance is reduced (from .62 to .14), However, it is still significant, indicating that it is a partial intermediary. It shows that the influence of market orientation on the

new products innovation performance has two effects.

One is the direct relationship between the two, and the other is the influence of market orientation on new product innovation performance is partly through absorptive capacity, which help the firm collect market information and transformed them into knowledge, apply to new product development, and thus improve the performance of new product innovation. We further conducted a confirmatory test based on the Sobel mediation process and found that market orientation has a positive effect on new product innovation performance through absorptive capacity. The indirect effect is 0.49 ($0.72 * 0.68$, $t = 4.52$, $p < 0.01$) (HAYES, 2013; SOBEL, 1982). Therefore, hypothesis H1 is supported.

4.2. Technological opportunity, Absorptive Capacity and New Product Innovation Performance

When analyzing the mediation effects of absorptive capacity on technological opportunity and new product innovation performance, three step regression process will be used to test the mediation role of absorptive capacity (BARON; KENNY, 1986). Meanwhile, three regression models will be established. In model 1, the independent variables are two control variables, firm age, firm scale, as well as technological opportunity, while the dependent variable is new product innovation performance.

This model aims at studying the effects of these control variables and technological opportunity on new product innovation performance. In model 2, the independent variables are two control variables, as well as technological opportunity, while the dependent variable is absorptive capacity. This model aims at studying the effects of these control variables and technological opportunity on the absorptive capacity. In model 3, absorptive capacity is added based on model 1.

In other words, model 3 is a full model containing all the control variables, technological opportunity, and absorptive capacity. Table 5 shows the regression operating results about mediation effects of absorptive capacity on technological opportunity and new product innovation performance.

Table 5: Results for Mediated Regression Analysis

| Variables | Criterion ACAP | | Criterion New Product Innovation Performance | | | |
|----------------|-------------------|---------|---|---------|-----------|---------|
| | Model 2 | | Model 1 | | Model 3 | |
| | β | t value | β | t value | β | t value |
| FA | -.01 | -.48 | .03 | 1.139 | .03 | 1.69 |
| FS | .02 | 1.11 | -.02 | -.847 | -.03 | -1.75 |
| TO | .37 | 9.36*** | .39 | 8.00*** | .14 | 2.98 |
| ACAP | | | | | .68 | 12.1*** |
| F value | 31.80*** | | 21.55*** | | 60.207*** | |
| R ² | 0.224 | | 0.163 | | 0.422 | |
| ΔR^2 | | | | | 0.159 | |
| F change | | | 21.55 | | 147.55*** | |

Note: This article used a two-tailed test for control variables and a one-tailed test for all hypotheses.

In Model 1, we use regression analysis to test the direct impact of technological opportunity on new product innovation performance. The results show that the technological opportunity has a significant positive impact on new product innovation performance ($\beta = .39, p < .001$). In addition, Model 2 suggests that technological opportunity have a positive effect on absorptive capacity ($\beta = .37, p < .001$). Finally, when absorptive capacity was added to Model 3, it showed a positive and significant effect on the innovation performance of new products ($\beta = .68, p < .001$)

It can also be seen from the analysis results that with the addition of absorptive capacity, the influence of technological opportunity on new product innovation performance is reduced (from .39 to .14), However, it is still significant, indicating that it is a partial intermediary. It shows that the influence of market orientation on the new products innovation performance has two effects.

One is the direct relationship between the two, and the other is the influence of technological opportunity on new product innovation performance is partly through absorptive capacity, which help the firm collect technological information and transformed them into knowledge, apply to new product development, and thus improve the performance of new product innovation. We further conducted a confirmatory test based on the Sobel mediation process and found that technological opportunity has a positive effect on new product innovation performance through absorptive capacity. The indirect effect is .25 ($0.37 * 0.68, t = 4.52, p < .01$) (HAYES, 2013; SOBEL, 1982). Therefore, hypothesis H2 is supported.

4.3. The Moderating Effect of Market Turbulence on the Relationship between Market Orientation and Absorptive Capacity



In this work, a series of models are established based on the hypothesis of moderate variables: Model 1 is composed of two control variables: firm age and firm size; model 2 added independent variables market orientation and the moderating variables absorptive capacity; Model 3 composed of elements in model 2, as well as the interaction of market orientation and absorptive capacity. Table 6 shows the regression results of market turbulence as a moderator.

Table 6: Results for Hierarchical Moderated Regression Analysis

| Variables | Model 1 | | Model 2 | | Model 3 | | VIF |
|----------------|---------|---------|-----------|---------|---------|---------|------|
| | β | t value | β | t value | β | t value | |
| FA | -.027 | -1.36 | -.03 | -2.14 | -.03 | -2.12 | 1.35 |
| FS | .051 | 2.47* | .04 | 2.28 | .033 | 2.14 | 1.36 |
| MO | | | .68 | 14.22 | .63 | 12.77 | 1.21 |
| MT | | | .11 | 3.04** | .13 | 3.59 | 1.12 |
| MO_X_MT | | | | | -.27 | -3.15** | 1.12 |
| F value | 3.061 | | 66.577 | | 56.683 | | |
| R ² | 0.018 | | .440 | | .455 | | |
| ΔR^2 | | | 0.422 | | 0.015 | | |
| F change | | | 127.76*** | | 9.914 | | |

*p<0.05, **p<0.01, ***p<0.001

Note: This article used a two-tailed test for control variables and a one-tailed test for all hypotheses.

In Table 6, all the coefficients of the variance inflation factor (VIF) are estimated to be lower than 10 (MASON; PERREAU, 1991), which indicating that de-centralizing of the variables has no effect on the operating results. Model 1 shows that when explaining absorptive capacity, the control variable can explain 1.8% for the variance. Model 2 shows that R² increased by 42.2% ($\Delta F = 127.76$, $p < .001$) after adding independent variables (market orientation) and moderation variables (market turbulence). As we mentioned above, market orientation has a significant and positive effect on Absorptive Capacity ($\beta = .68$, $p < .001$).

Model 2 also shows that market turbulence has significant and positive effect on absorptive capacity ($\beta = .11$, $p < .01$), which means that the stronger the market turbulence, the more information consumers and competitors receive from the business, the more conducive for the firm to absorb knowledge outside.

In Model 3, we added the regression equation of market orientation and market turbulence interaction terms to adjust the effects of market orientation on absorptive capacity, R² increased by 1.5% ($\Delta F = 9.914$ $p > .05$). One-tailed tests are often used to verify the hypothesis of the direction of the forecast, The effect of market orientation and market turbulence on the absorptive capacity is significant (β

= - .27, t = -3.15, p <0.01).

With stronger market turbulence, the relationship between market orientation and absorptive capacity is weakened ($\beta = .48$, t = 5.66, p <0.01). When market turbulence is lower, there is a positive relationship between market orientation and absorptive capacity ($\beta = .78$, t = 9.22, p <.01). This result shows that Market orientation has a significant effect on absorptive capacity with stronger market turbulence relative lower turbulence. Therefore, hypothesis H3 is supported.

4.4. The Moderating Effect of Market Turbulence on the Relationship between Technological Opportunity and Absorptive Capacity

In this work, a series of models are established based on the hypothesis of moderate variables: Model 1 is composed of two control variables: firm age and firm size; model 2 added independent variables technological opportunity and the moderating variables absorptive capacity; Model 3 composed of elements in model 2, as well as the interaction of technological opportunity and absorptive capacity. Table 7 shows the regression results of market turbulence as a moderator.

Table 7: Results for Hierarchical Moderated Regression Analysis

| Variables | Model 1 | | Model 2 | | Model 3 | | VIF |
|----------------|---------|---------|-----------|----------|-----------|---------|-------|
| | β | t value | β | t value | β | t value | |
| FA | -.03 | -1.36 | -.009 | -.497 | -.009 | -.504 | 1.363 |
| FS | .05 | 2.47* | .023 | 1.223 | .023 | 1.244 | 1.390 |
| TO | | | .328 | 8.103*** | .327 | 8.066 | 1.122 |
| MT | | | .151 | 3.757*** | .163 | 3.924 | 1.170 |
| TO_X_MT | | | | | .081 | 1.130 | 1.079 |
| F value | 3.061 | | 28.322 | | 22.932*** | | |
| R ² | 0.018 | | 0.247 | | .247 | | |
| ΔR^2 | | | 0.229 | | 0.000 | | |
| F change | | | 52.631*** | | 1.278 | | |

*p<0.05, **p<0.01, ***p<0.001

Note: This article used a two-tailed test for control variables and a one-tailed test for all hypotheses.

In Table 7, all the coefficients of the variance inflation factor (VIF) are estimated to be lower than 10 (Mason & Perreault, 1991), which indicating that decentralizing of the variables has no effect on the operating results. Model 1 shows that when explaining absorptive capacity, the control variable can explain 1.8% for the variance. Model 2 shows that R² increased 22.9% ($\Delta F = 52.631$, p < 0.001) after adding independent variables (technological opportunity) and moderation variables (market turbulence). As we mentioned above, technological opportunity has a

significant and positive effect on Absorptive Capacity ($\beta = .68$, $p < .001$).

Model 2 also shows that market turbulence has significant and positive effect on absorptive capacity ($\beta = .15$, $p < .001$), which means that firms pay more attention to the market turbulence and help for enhancing the firms' absorptive capacity.

In Model 3, we added the regression equation of technological opportunity and market turbulence interaction terms to adjust the effects of technological opportunity on absorptive capacity, R^2 increased by 0.0% ($\Delta F = 1.278$, $p > 0.05$). Technological opportunity and market turbulence had no significant effect on the absorptive capacity ($\beta = .081$, $p > .05$). This shows that the relationship between technological opportunity and the absorptive capacity is not affected by the market turbulence. Therefore, H4 is not supported.

5. CONCLUSIONS AND FUTURE RESEARCH

Innovation drives firm to improve new product innovation performance, but there are many drivers. The study taking market orientation and technological opportunity as innovation-driven factors, discussing the relationship of innovation-driven, absorptive capacity and new product innovation performance, and proved that firms driven by market orientation can master customers' needs and cultivate their own absorptive capacity, which contribute to the improvement of new product innovation performance .

Market turbulence has an important and positive impact on absorptive capacity, which means the stronger the change in customer demand, the more information the firm gets about consumers and competitors and much beneficial for the absorption of knowledge by the firm. However, the quantity and complexity of information that customers obtain from their customers and competitors will face many uncertainties in the process of acquisition.

Is the acquired knowledge correct? Whether knowledge be absorbed by employees? Whether new products or new services produced meet the needs of consumers? Such factors will affect the process from acquiring knowledge to assimilating, developing, and applying knowledge. As a result, the stronger the market turbulence, the relationship between market orientation and absorptive capacity is weakened.

This research proposes that the process from innovation-driven to product performance must be accomplished through absorptive capacity, that is, absorptive



capacity plays an intermediary role. The study extends the framework Zahra and George proposed in 2002, which is only theoretically discussed and has not been empirically tested. Meanwhile, this study emphasizes the importance of the firm's focus on changes in customer needs, changes in competitors in the industry, which prompted firms to pursue the cultivation of their own absorptive capacity. The evidence contributes to the development of innovative literature and knowledge-based theory.

Firms should be market-oriented and constantly grasp the changes in customers' needs. In order to seize opportunities, firms and managers need to pay attention to market knowledge, grasp market changes. Firm leaders also be positive about market orientation and be prepared for risks. Only by continuously obtaining the information that firms need, can they win in the market competition and gain competitive advantage.

There are several limitations should be considered in the interpretation of the results. First of all, the data are mainly from China, and the sample data are mainly from Beijing, Shenzhen and Shandong Province. Therefore, the universality of the results is limited. Secondly, although some variables, such as firm age, firm scale was controlled, they did not include some potential influence factors such as innovation agree, innovation tendency.

In the future research, these contents can be further studied. Lastly, sample data used in this article was cross-sectional data. Future research can target a certain amount of firm sample data and select longitudinal data with a certain time span to further discuss, and dynamically explain the evolution mechanism of market orientation, absorptive capacity and its impact on new product innovation performance.

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