

Dynamic Interaction Mechanism Model Between Market Competition, Marketing Innovation and Enterprise Innovation

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Abstract—The research results of marketing innovation and market performance are relatively rich, but the research results of marketing innovation and enterprise innovation performance are relatively insufficient. This study uses 289 companies as research samples to construct a dynamic interaction mechanism model between market competition, marketing innovation and enterprise innovation performance, empirically testing the effects of market competition, marketing innovation and corporate innovation performance. The research shows that market competition promotes the improvement of enterprise innovation performance. Different market competition levels have different effects on the innovation performance of enterprises; marketing innovation has an effect on the innovation performance of enterprises, and the effect of different marketing innovation levels on the innovation performance of enterprises exists. Differences; market competition, marketing innovation and enterprise innovation performance have an interaction effect; market competition and marketing innovation have greater incentive effect on private enterprise innovation performance than state-owned enterprises, market competition and marketing innovation have higher effect on high-tech enterprise innovation performance than traditional enterprise.

Keywords—*market competition; marketing innovation; innovation performance*

I. INTRODUCTION

Under the background of the new economy, China has entered the era of business 4.0, and the market environment is undergoing profound and complicated changes. The market competition presents a three-dimensional competition situation, and the market competition enters the five products, services, communities, platforms and ecosystems. Dimensional competition, customer demand is changing, consumption upgrade is compatible with consumption degradation, traditional product competition, channel competition, promotion competition, service competition are more and more difficult to win in the new market environment in the new era, and corporate marketing activities are increasingly facing many Difficulties and challenges. The new market competition environment has spawned enterprise marketing innovation, and marketing innovation is one of the sources of enterprise development.

The result of enterprise innovation activities has formed the innovation performance of enterprises. Marketing innovation is a way of enterprise innovation activities. How does marketing innovation affect enterprise innovation performance? What is the mechanism of market competition affecting enterprise innovation performance? Market competition, marketing innovation and innovation whether there is a linear relationship or a non-linear relationship between performances, major problems to be solved in the development of these theories and practices are still lacking intensive research.

In view of this, this paper hopes to solve these problems to a certain extent and make up for the gaps in the above literature research. This paper holds that market competition can improve enterprise innovation performance level through enterprise competence and marketing innovation. Based on this, it constructs a corresponding theoretical framework, deeply analyses the mechanism of market competition and marketing innovation affecting enterprise innovation performance, and tests the dynamic interaction effect between market competition, marketing innovation and innovation performance by investigating and obtaining empirical data, so as to open up market competition and operation. The "black box" from marketing innovation to enterprise innovation performance provides an important reference for the development of market competition theory, marketing innovation theory and innovation performance promotion.

II. LITERATURE REVIEW

At present, academic research on the relationship between market competition and innovation performance has drawn two opposite conclusions. One is that market competition has a positive effect on innovation, and the other is that market competition has a negative effect on innovation performance. Representative research results are: large enterprises with higher market power can obtain better innovation performance, the market competition environment is conducive to improving the innovation performance of private enterprises, market forces have a positive impact on independent innovation performance[1], market orientation has a positive impact on innovation

performance[2], the degree of market competition has a negative effect on the efficiency of enterprise technology innovation, the degree of regional market competition has a negative impact on the innovation performance of enterprises[3], the degree of market competition Negative impact on innovation efficiency[4].

At present, academic research on marketing innovation and corporate innovation performance in the full sense has not yet begun. The main research results of this topic include: marketing process innovation is indispensable for improving performance, innovative products enhance customer value and achieve profitability, the higher the product innovation level, the better the company's performance, products Innovation has a mediating effect on the relationship between market orientation and organizational performance. Customer orientation and effective departmental coordination are two key resources for obtaining good market performance [5]. Marketing has a positive impact on market performance. Alternative marketing capabilities can create better performance, and marketing capabilities have a significant positive impact on market performance. The impact of marketing capabilities on innovation performance is constrained by other conditions or factors Marketing ability has a negative impact on innovation performance , marketing ability has a positive impact on innovation performance, marketing innovation to build product strategies and marketing strategies that other competitors can not imitate to improve the enterprise market Performance and financial performance, marketing strategy innovation has a positive impact on market performance, marketing ability has a positive effect on innovation performance, marketing ability and technical ability can be more When complementing each other, it is more conducive to improving the innovation performance of enterprises. Marketing innovation has an important mediating effect between driving market orientation and organizational performance. Marketing innovation has a U-shaped relationship with the performance of new ventures [6]. Technical fluctuations and market changes The two external environments have a regulatory effect on the innovation performance of the two innovation dimensions of technological novelty and market novelty [7], and marketing innovation and its dimensions have a significant positive impact on corporate performance [8], marketing innovation plays a full intermediary role between composite orientation and organizational performance, the theoretical model of the relationship between product innovation and innovation performance [10].

In summary, the academic community has made some achievements in the research of market competition, marketing innovation and enterprise innovation performance. These research results are helpful to understand the mechanism and effect between the three, but few scholars have included the three in one. Explore the dynamic interaction mechanism and interaction between the three in the theoretical framework. The research on market competition, marketing innovation and innovation performance can be expanded in three aspects: the mechanism and effect of market competition affecting

innovation performance; the mechanism and effect of marketing innovation affecting innovation performance; market competition, marketing innovation and the dynamic interaction mechanism of innovation performance and its interaction effects.

III. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

A. *Market Competition and Enterprise Innovation Performance*

Market competition is the normal state of enterprises. The basic content of market competition includes information competition, commodity competition, price competition, service competition, reputation competition, and quality ability competition. The core of commodity competition is quality competition. Commodity competition requires enterprises to continuously improve product strength, and to create products with quality and taste through product efforts to win in commodity competition. Information competition requires enterprises to make full use of new technologies such as the Internet of Things and cloud computing to obtain relevant information, and use information to build a new model to surpass competitors and create competitive advantage. Price competition is a competitive way to deal with competitors' pricing or price changes. Enterprises need to determine the price of products and services by taking into account factors such as cost, profit, consumer acceptance, and competitor pricing. Service competition is the magic weapon for enterprises to win. In the post-industrial era and the mobile Internet era, enterprises need to do good service and experience to obtain passenger traffic. Service competition has become one of the main influencing factors of enterprise innovation performance. Service competition requires enterprises to have deep insight into consumer demand. From the perspective of satisfying human nature, we will do enough services. Credit competition is the key to the competition of enterprises in the era of mobile Internet. The basis of credit competition is the product quality, reputation, brand reputation and service satisfaction. Good reputation is one of the effective means to create differentiated competitive advantage of enterprises. Good Reputation is also one of the effective ways to improve innovation performance. Enterprise quality competency includes R&D capability, marketing capability, innovation, organization, execution, and financial ability. Resources are the basic guarantee for enterprises to participate in competition. The ability of enterprises directly determines the key to whether enterprises can win when they participate in market competition. Enterprise innovation performance is the result of various innovation activities of enterprises. Market competition encourages enterprises to carry out various innovation activities. Market competition forces enterprises to improve their own quality and ability. The successful development of various innovation activities requires the support of enterprise quality and ability. Quality and ability are the basis for carrying out various innovation activities. After the integration of various innovation activities and enterprise capabilities, the results of various innovation activities have formed innovative performance.

Therefore, the path of market competition to the innovation performance of enterprises is “market competition — Innovation activities — Enterprise quality and ability — Innovation performance”. Therefore, this paper proposes the following assumptions:

Hypothesis one: Market competition has a positive effect on corporate innovation performance.

B. Marketing Innovation and Innovation Performance

As China's economy enters a stage of high-quality development, China is experiencing a rise in consumption. Consumption is China's largest real economy; the rapid development of a new generation of information technology represented by mobile Internet, Internet of Things, cloud computing, etc. has expanded the space and format of Chinese consumption. It has also spawned many new consumption models. New consumption, represented by smart consumption and green consumption, is becoming the mainstream trend in the future consumption field. At the same time, market competition has also advanced to five products, services, communities, platforms and ecosystems. Dimensional competition, the new era of the market has become a three-dimensional competition of the space, the market is rapidly undergoing fission, the speed of market changes faster than the speed of marketing, the traditional marketing model, marketing framework and marketing concepts must be rethought, face large The era of change companies must focus on changes in consumer demand, initiative to seek new changes, embrace big data and artificial intelligence, embrace the Internet and social media. The essence of marketing is the long-term competition between enterprise wisdom and user's mind. The essence of marketing is to occupy the customer's mind. The marketing industry standard is to quickly open up the consumption scene and realize the marketing of the whole link in a short and fast way. Under the new marketing environment, enterprises need to see the market trend and understand the essential changes of the marketing environment. Marketing innovation has become an inevitable choice for enterprises to cope with market fission and consumer transformation. How can enterprises find suitable users at the right time in the era of information explosion in the mobile Internet era? Appropriate communication language and scenes quickly occupy the user's mind, and marketing innovation has become the lifeline of the company.

Marketing innovation is an eternal process of seeking breakthroughs and transformations. The focus of marketing innovation is to create consumer value. The key to marketing innovation is to effectively integrate with the existing resources of the enterprise and to connect with the market environment in which the enterprise is located. Marketing Innovation quickly connects with relevant stakeholders through the use of combination, improvement, new use, and take-up. Marketing innovation includes value innovation, product innovation, channel innovation, model innovation, factor innovation, and detailed execution. Marketing innovation is improving. An important tool for marketing efficiency, marketing innovation must achieve the effect of attracting and retaining consumers. The basis of marketing

innovation is marketing wisdom. The more is the marketing wisdom, the richer is the marketing innovation, and the more is the inspiration for corporate marketing. The marketing wisdom comes from the integration application of big data and the new technology to real-time dynamic analysis of user data, data, Algorithms and artificial intelligence drive marketing innovation; marketing innovation also comes from market trends and customer needs. The basic premise of marketing innovation is problem awareness. The marketing innovation process includes accurately asking questions, defining problems, analyzing problems, solving problems, and marketing innovation is in helping consumers solve problems, marketing innovation can effectively influence consumers' purchasing decisions, increase the market acceptance of products, create a sustainable appeal, and continuously spread consumers by revealing consumer pains and giving consumers hope. Product cognition and goodwill, expanding market share, marketing innovation can also drive product upgrades, incite market value, create lifestyles, iron out market turmoil, promote social progress, enhance corporate brands, and establish barriers to competition. Marketing innovation is one of the types of corporate innovation activities. Marketing innovation can expand sales scale, increase market share, and increase profits. The result of marketing innovation is one of the results of various innovation activities of enterprises. Therefore, this paper proposes hypothesis two:

Hypothesis two: Marketing innovation has an incentive effect on corporate innovation performance.

C. Market Competition, Marketing Innovation and Innovation Performance

At present, the market characteristics of China's macro economy are that the country is retreating, pushing up and selling, and the trend of retreating from the country is very clear. The company claims to push up the sale and the inside is to push up the price, essentially It is the product upgrade and new service. In the Internet age, the social rhythm is getting faster and faster. The market competition is more and more emphasis on time and speed. The market reaction, product activities promotion and response to competition are all fast. The life span of the enterprise, the life cycle of the product, and the time window for competing for users are all in the market. Rapidly shortened, the way value creation and value acquisition have changed; consumers have focused on transaction value before and now they are most concerned about the use value. Enterprises used to focus on the mass market and now think that everyone is the market. Previously, the industry had boundary constraints and now it is Cross-border synergy, cross-border development, cross-border cooperation, and cross-border ecology. At the same time, the traditional marketing model has gradually failed. The flattening of channels and the upgrading of terminal formats have led to a reduction in channel intensive space, channel dividends and terminal dividends have disappeared; commercial concentration after urbanization has led to a decline in secondary market growth and new generation consumption growth; The value orientation and purchasing behavior have undergone profound changes; traditional

marketing resources, marketing personnel and marketing management have increased inputs and consumption value has decreased. The basic logic of marketing is to understand consumers, do the right things, communicate with consumers from both product and market dimensions, how to focus on group consumers and individual consumers, how to communicate effectively with consumers, and how to achieve advertising consensus, this is a real problem that companies must solve. Regardless of how the market environment changes, the products, customer links, experiences, services, and efficiencies in marketing have not changed. The market has undergone tremendous changes and fission, the introduction and promotion of new technologies is getting faster and faster, and the upgrading and personalization of consumer demand has forced companies to actively carry out marketing innovation. The trend of marketing in the new era is to shift from homogenous quality to attractive products. From one-way channel coverage to omni-channel and new terminal construction, from low-price shocks to high sales, from promotion incentives to scene experiences, from Guangxu bombing to entertainment interaction, the final marketing moves toward self-powered marketing, that is, consumers A single IP for the center to achieve a single marketing, automatic customization, automatic communication, automatic promotion. New era, new market environment, new technology, and new consumers pose challenges and opportunities for enterprise marketing. Enterprises can only implement marketing innovation dynamically, apply new marketing concepts, new marketing ideas, new marketing methods, and dare to break through in the fierce market. Winning in the competition, only by actively carrying out marketing innovation can we adapt to the market. Market competition forces marketing innovation. Market competition also encourages enterprises to enhance their ability to innovate, market, organize, and execute. The successful foundation of marketing innovation is the resources and capabilities of enterprises. The capabilities of enterprises are the support of successful marketing innovation. In the process of strength and marketing innovation, the capabilities of enterprises are further improved. The improvement of various capabilities of enterprises can ensure that enterprises win in the market competition. Market competition and marketing innovation are actually a two-way driven relationship.

The focus of marketing innovation lies in discovering, stimulating, creating and satisfying consumer-subdivided, potential, unmet needs. The core of marketing innovation is to improve efficiency and create value. Products are king, brand is king, and ecology is king. The ability to be king is the general idea of marketing innovation. Marketing innovation requires marketing efficiency to be accurate, fast, and good. The experience should be three-dimensional, community-based, and socialized. Good products are the last word. Intense market competition requires enterprises to reconstruct people and goods. , field, customer, service, enterprises want to compete in the cruel market to win the need to do user community, value integration, collaborative ecological, experience three-dimensional, promote network red, business combination, operational intelligence, Ability to platform, create omni-channel, full-link, full-scenario

marketing model, to provide consumers with the ultimate experience with professional value-added, efficient response, gratitude and warmth, intimate interaction, etc., with new scenarios, new terminals, new cross-border, New promotion, new service reconstruction transaction mode, promotion form, promotion implementation and cooperation mode must be innovative to provide customers with moving services. Through marketing innovation, the company will enhance its advantages in new consumption scenarios, consumer groups, and consumption trends, increase value through services, expand differences through experience, deepen relationships through interaction, and systematically ensure continuous expansion of sales scale and create more profits. Through marketing innovation, companies can achieve continuous improvement in innovation performance by deepening customer relationships, responding quickly to markets, and integrating resources across borders. Enterprises adopt market innovations such as product mix, brand resonance, service alliance, and channel sharing to cope with market competition. Through marketing innovation, enterprises successfully connect products and their services with the needs of consumers, and enhance innovation on the basis of exchange value and value creation. The performance level and the improvement of innovation performance also promote the enterprise to carry out marketing innovation, and the improvement of innovation performance further promotes the enterprise to enhance its own capabilities. Therefore, this paper proposes hypothesis three.

Hypothesis three: There is an interaction between market competition, marketing innovation and corporate innovation performance.

IV. RESEARCH DESIGN

A. Sample Source and Data Collection

This paper selects high-tech enterprises and traditional enterprises as research objects, and the research objects are from related enterprises in Guangdong, Fujian, Zhejiang, Jiangsu, Jiangxi and Hubei. The data were collected by questionnaire survey. The design of the questionnaire was mainly derived from the mature scale of the existing literature. The questionnaire is distributed and recycled from January 2015 to March 2017. The issuance and recycling of the questionnaire is mainly carried out in two ways. The first is that the project team completed the field research of 127 enterprises in the winter and summer vacation through acquaintances, and recovered 127 valid questionnaires. The second is to issue questionnaires to 296 companies through the relationship network of the project team members, and 296 questionnaires were returned, of which 162 were valid questionnaires, and the effective questionnaire recovery rate was 54.73%. In the end, 289 companies were selected as research samples. Among the research samples, there were 114 state-owned or state-controlled enterprises, 175 private enterprises, 126 high-tech enterprises, and 163 traditional enterprises. This paper uses Stata14.0 statistical software to analyze the relevant data.

B. Variable Measurement and Reliability and Validity Test

1) *Enterprise innovation performance*: Based on the research of Qian Xihong et al [11] and Jiao[12], the scale of enterprise innovation performance is designed as 10 items: the number of invention patents granted by enterprises and every 1,000 enterprises The ratio of R&D personnel; the sales revenue of new products accounts for the proportion of main business income; compared with peers, it is often the first in the industry to promote organizational and management innovation; compared with peers, it is often the first to introduce new products/new services in the industry; Compared with peers, it is the first to apply new technologies in the industry; compared with its peers, product improvement and innovation have a very good market response; compared with its peers, products contain first-class advanced technology and technology; compared with peers, new product development The success rate is very high; compared with peers, the number of patent applications; the speed of development of new products compared with peers. Ten items were evaluated using the Likert seven-level scale. Using principal component analysis, the KMO value was 0.876, the Bartlett spherical test value was 494.173, and the significant level was 0.000, indicating that it was very suitable for factor extraction. The common factor explained 77.412% of the total variation, indicating that the scale has a good construction. Validity; the reliability test results showed that the α coefficient of each study variable exceeded 0.937, indicating that the overall reliability of the questionnaire was good. Enterprise innovation performance is expressed by EIP.

2) *Market competition*: Market competition is replaced by the degree of competition. Drawing on the competition degree measurement methods of Mia and Clarke[13], Pan Fei and Zhang Chuan[14], the competition degree scale is designed as 8 items: the competition situation of the company's industry, production (or service) speed of technology update, speed of new products, number of competitors, market share of the company in which the company is located, degree of government regulation of the company's industry, degree of price competition in the industry of the company, and frequent outbreaks of promotion in the industry. Eight items were evaluated using the Likert seven-point scale. Using principal component analysis, the KMO value was 0.826, the Bartlett spherical test value was 468.147, and the significant level was 0.000, indicating that it was very suitable for factor extraction. The common factor explained 75.971% of the total variation, indicating that the market competition scale has a higher good construction validity; the reliability test results show that the α coefficient of each research variable exceeds 0.914, indicating that the overall reliability of the questionnaire is better. Market competition is expressed by MC.

3) *Marketing innovation*: Based on the research of Knight et al.[15] , Yang Wei et al[6], Wen Liang et al[8] ,

the scale of marketing innovation is designed as 15 items: Ways to integrate marketing activities; companies adopt new methods to segment markets; companies adopt new methods to improve the effectiveness of product pricing; companies adopt new methods to improve the effectiveness of advertising; in terms of product development compared with their peers enterprises boldly introduce new technologies, new materials, new designs, new processes, and product iteration speed is relatively fast; corporate marketing capabilities continue to improve; corporate marketing concepts continue to innovate; corporate marketing channel innovation; enterprise service innovation; corporate marketing innovation Enterprise marketing process innovation; the company always launches promotions in the market that reflect product (service) technology improvements or concept updates; the company is always expanding new marketing channels to make product (service) technology improvements or concept updates Maximize; companies often launch new ads to promote product (service) technology improvements or concept updates; The new marketing activities have been developed on the basis of the previous, and the new marketing activities reflect the product (service) technology improvements or concept updates obtained by the company. All 15 items were evaluated using the Likert seven-point scale. Using principal component analysis, the KMO value was 0.851, the Bartlett spherical test value was 459.372, and the significant level was 0.000, indicating that it was very suitable for factor extraction. The common factor explained 74.631% of the total variation, indicating that the market competition scale has a higher Good construction validity; the reliability test results show that the α coefficient of each research variable exceeds 0.927, indicating that the overall reliability of the questionnaire is better. Marketing innovation is represented by MI.

C. Research Model Construction

Based on the existing research results, this paper establishes a model one to test the impact of market competition on corporate innovation performance.

$$EIP_{i,t} = \lambda_0 + \lambda_1 MC_{i,t} + \lambda_2 SZ_{i,t} + \lambda_3 AG_{i,t} + \varepsilon_{i,t} \quad \text{Model one}$$

Based on the existing research results, this paper establishes a model two to test the impact of marketing innovation on corporate innovation performance.

$$EIP_{i,t} = \kappa_0 + \kappa_1 MI_{i,t} + \kappa_2 SZ_{i,t} + \kappa_3 AG_{i,t} + \varepsilon_{i,t} \quad \text{Model two}$$

Among them, EIP represents the innovation performance of the enterprise, subscript i represents the company, and t represents the year. MC stands for market competition and MI stands for marketing innovation. SZ stands for the size of the company, and the size of the company is measured using the natural logarithm of the

number of employees. AG represents the age of the company, and the age of the company is based on the natural logarithm of the establishment of the company. ε is a random disturbance term.

In order to test the dynamic interaction between market competition, marketing innovation and corporate innovation performance, based on the existing research results, this paper establishes panel vector autoregressive model.

$$Y_{i,t} = \eta_0 + \eta_1 Y_{i,t-1} + F_i + G_i + \zeta_{it} \quad \text{Model three}$$

Among them, $Y_{i,t}$ represents the vector of the first i enterprise consisting of endogenous variables in the t year, followed by enterprise innovation performance, business model innovation and market competition. The subscript ($i = 1, 2, 3, \dots, 289$) represents 289 samples. Enterprise t means 2014-2017. η is the regression coefficient, F_i is the fixed effect, G_i is the time effect, and ζ_{it} is the random disturbance term.

V. EMPIRICAL TEST AND RESULTS ANALYSIS

A. Descriptive Statistical Analysis

It can be seen from “Table I” that the average innovation performance of enterprises is 27.37, and the innovation level is not too high. The maximum value is 51.11, and the minimum value is 7.03, indicating that there is a big difference in the level of innovation of enterprises. The average market competition degree is 11.26, indicating that the sample enterprise market competition level is not high, the maximum value is 39.16, and the minimum value is 5.24, indicating that there is a big difference in the sample enterprise market competition. The average value of marketing innovation is 21.58, which indicates that marketing innovation has strong correlation with corporate innovation performance, with a maximum of 41.21 and a minimum of 5.12, indicating that marketing innovation has great differences in innovation performance of different enterprises. (See “Table I”)

TABLE I. VARIABLE DESCRIPTIVE STATISTICS

| Variable name | Mean | Standard deviation | Maximum | Minimum value | samples |
|---------------|-------|--------------------|---------|---------------|---------|
| <i>EIP</i> | 27.37 | 11.06 | 51.11 | 7.03 | 289 |
| <i>MC</i> | 11.26 | 7.15 | 39.16 | 5.24 | 289 |
| <i>MI</i> | 21.58 | 6.35 | 41.21 | 5.12 | 289 |
| <i>SZ</i> | 3.37 | 0.974 | 6.12 | 1.62 | 289 |
| <i>AG</i> | 1.78 | 0.64 | 3.46 | 0.61 | 289 |

B. Regression Results and Analysis of Market Competition and Enterprise Innovation Performance

Taking the innovation performance of the enterprise as the dependent variable and the market competition as the independent variable, the model one is used to test the hypothesis one. “Table II” gives the regression results of the whole sample. After controlling the scale of the enterprise and the age of the enterprise, the market competition has a significant positive impact on the innovation performance of the enterprise. The corresponding standardized regression coefficient reaches 0.143***, and the hypothesis 1 is supported.

In order to further analyze the impact of different market competition levels on the innovation performance of

enterprises, this paper divides the sample into three sub-sample groups of high market competition, medium market competition and low market competition according to the competition degree score, and examines their impact on the innovation performance of enterprises. The regression results show that the corresponding standardized regression coefficients of high market competition, medium market competition and low market competition are 0.289***, 0.114**, and 0.067*, respectively, indicating high market competition, medium market competition, and low market competition for enterprise innovation. There is a big difference in the degree of impact of performance, indicating that increasing the degree of market competition is one of the main ways to improve the innovation performance of enterprises.

TABLE II. REGRESSION RESULTS OF MARKET COMPETITION AND CORPORATE INNOVATION PERFORMANCE

| variable | Full Sample of Market Competition | Sample Group of High Market Competition | Sample Group of Medium Market Competition | Low Market Competition Sample Group |
|-----------------|-----------------------------------|---|---|-------------------------------------|
| <i>MC</i> | 0.143** (3.35) | 0.289*** (4.18) | 0.114** (3.32) | 0.067* (2.98) |
| <i>SZ</i> | -0.027* (-2.93) | -0.075* (-3.22) | -0.041* (-2.97) | -0.014* (-2.95) |
| <i>AG</i> | -0.037* (-2.99) | -0.045* (-3.02) | -0.022* (-2.99) | -0.001* (-2.93) |
| <i>constant</i> | -0.002** (-3.44) | -0.013** (-3.56) | -0.014* (-3.12) | -0.011** (-3.07) |

| variable | Full Sample of Market Competition | Sample Group of High Market Competition | Sample Group of Medium Market Competition | Low Market Competition Sample Group |
|--------------------------|-----------------------------------|---|---|-------------------------------------|
| <i>Adjusted - R2</i> | 0.311 | 0.368 | 0.305 | 0.256 |
| <i>Durbin - Watson</i> | 1.01 | 1.02 | 1.01 | 1.01 |
| <i>F</i> | 48.21 | 49.76 | 47.13 | 45.07 |
| <i>Number of samples</i> | 289 | 96 | 96 | 97 |

^a Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively.

Further, the whole sample is divided into the sample group of state-owned enterprises and the sample group of private enterprises, and then the regression analysis is performed on the two groups of samples. The regression results are shown in "Table III". The regression results show that the standardized regression coefficient of market competition in the private enterprise sample group reaches 0.503***, state-owned The standardized regression coefficient of market competition in the enterprise sample group reached 0.007**, which indicates that the promotion effect of market competition on the innovation performance of private enterprises is greater than the promotion effect of market competition on the innovation performance of state-owned enterprises, indicating the market innovation competition performance of different ownership enterprises. There are differences in the promotion.

Further, the whole sample is divided into high-tech enterprise sample group and traditional enterprise sample group, and then the two groups of samples are subjected to regression analysis. The regression results are shown in Table 3. The regression results show that the standardized regression coefficient of market competition in the high-tech enterprise sample group reaches 0.478***. The standardized regression coefficient of market competition in the traditional enterprise sample group has reached 0.013**, which indicates that the promotion effect of market competition on the innovation performance of high-tech enterprises is greater than the promotion effect of market competition on the innovation performance of traditional enterprises.

TABLE III. REGRESSION RESULTS OF MARKET COMPETITION AND INNOVATION PERFORMANCE OF DIFFERENT SAMPLE GROUPS

| Variable name | Private enterprise sample group | State-owned enterprise sample group | High-tech enterprise sample group | Traditional enterprise sample group |
|--------------------------|---------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| <i>MC</i> | 0.483*** (4.31) | 0.013** (3.12) | 0.581*** (4.64) | 0.023** (3.22) |
| <i>SZ</i> | 0.011** (3.14) | 0.008** (3.11) | 0.036** (3.51) | 0.012** (3.17) |
| <i>AG</i> | 0.021** (3.17) | 0.003** (3.12) | 0.021** (3.27) | 0.011** (3.11) |
| <i>constant</i> | -0.043*** (-3.34) | -0.022*** (-3.34) | -0.031*** (-3.42) | -0.013*** (-3.37) |
| <i>Adjusted - R2</i> | 0.331 | 0.264 | 0.359 | 0.259 |
| <i>Durbin - Watson</i> | 1.01 | 1.03 | 1.01 | 1.04 |
| <i>Number of samples</i> | 175 | 114 | 126 | 163 |

^a Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively.

C. Regression Results of Marketing Innovation and Corporate Innovation Performance

It takes enterprise innovation performance as the dependent variable, markets innovation as the independent variable, and uses model two to test hypothesis two. "Table IV" gives the regression results of the whole sample. After controlling the scale of the enterprise and the age of the enterprise, marketing innovation has a significant positive impact on the innovation and innovation of the enterprise. The corresponding standardized regression coefficient reaches 0.325***, and the hypothesis two is supported.

In order to further investigate the impact of different marketing innovation levels on corporate innovation performance, marketing innovation is divided into three sub-sample groups: high marketing innovation, medium marketing innovation and low marketing innovation according to marketing innovation scores, and then examine their impact on corporate innovation performance. From the

regression results, the corresponding standardized regression coefficients of high marketing innovation, medium marketing innovation, and low marketing innovation are 0.542***, 0.312**, and 0.117*, respectively, which shows high marketing innovation, medium marketing innovation, and low marketing innovation. The impact of corporate innovation performance is quite different, indicating that improving marketing innovation level is an important measure to improve innovation performance.

TABLE IV. REGRESSION RESULTS OF MARKETING INNOVATION AND CORPORATE INNOVATION PERFORMANCE

| Variable name | Total marketing innovation sample | High Marketing Innovation Sample Group | Medium Marketing Innovation Sample Group | Low marketing innovation sample group |
|--------------------------|-----------------------------------|--|--|---------------------------------------|
| <i>MI</i> | 0.325** (3.44) | 0.542*** (4.861) | 0.312** (3.22) | 0.117* (2.99) |
| <i>SZ</i> | -0.032* (-3.01) | -0.053** (-3.45) | -0.005* (-3.01) | -0.002* (-2.98) |
| <i>AG</i> | -0.004* (-2.98) | -0.011** (-3.36) | -0.003* (-3.03) | -0.004* (-2.95) |
| <i>constant</i> | -0.013** (-3.21) | -0.064** (-3.44) | -0.032** (-3.14) | -0.011** (-3.18) |
| <i>Adjusted – R2</i> | 0.327 | 0.358 | 0.302 | 0.278 |
| <i>Durbin - Watson</i> | 1.01 | 1.01 | 1.01 | 1.01 |
| <i>Number of samples</i> | 289 | 96 | 96 | 97 |

The sample is further divided into a sample group of state-owned enterprises and a sample group of private enterprises, and then regression analysis is performed on the two groups of samples. The regression results are shown in “Table V”. The regression results show that the standardized regression coefficient of marketing innovation in the private enterprise sample group reaches 0.483***, state-owned The standardized regression coefficient of marketing innovation in the enterprise sample group reached 0.013**, which indicates that the promotion effect of marketing innovation on the innovation performance of private enterprises is greater than the promotion effect of marketing innovation on the innovation performance of state-owned enterprises, indicating the innovation performance of marketing innovation to different ownership enterprises. There are differences in the promotion.

The whole sample is further divided into high-tech enterprise sample group and traditional enterprise sample group, and then regression analysis is performed on the two groups of samples respectively. The regression results are shown in “Table V”. The regression results show that the standardized regression coefficient of marketing innovation in the high-tech enterprise sample group reaches 0.581*** The standardized regression coefficient of marketing innovation in the traditional enterprise sample group reached 0.023**, which indicates that the promotion effect of marketing innovation on the innovation performance of high-tech enterprises is greater than the promotion effect of marketing innovation on the innovation performance of traditional enterprises.

TABLE V. REGRESSION RESULTS OF MARKETING INNOVATION AND INNOVATION PERFORMANCE OF DIFFERENT SAMPLE GROUPS

| Variable name | Private enterprise sample group | State-owned enterprise sample group | High-tech enterprise sample group | Traditional enterprise sample group |
|--------------------------|---------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| <i>MI</i> | 0.483*** (4.31) | 0.013** (3.12) | 0.581*** (4.64) | 0.023** (3.22) |
| <i>SZ</i> | 0.011** (3.14) | 0.008** (3.11) | 0.036** (3.51) | 0.012** (3.17) |
| <i>AG</i> | 0.021** (3.17) | 0.003** (3.12) | 0.021** (3.27) | 0.011** (3.11) |
| <i>constant</i> | -0.043*** (-3.34) | -0.022*** (-3.34) | -0.031*** (-3.42) | -0.013*** (-3.37) |
| <i>Adjusted – R2</i> | 0.331 | 0.264 | 0.359 | 0.259 |
| <i>Durbin - Watson</i> | 1.01 | 1.03 | 1.01 | 1.04 |
| <i>Number of samples</i> | 175 | 114 | 126 | 163 |

^a Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively.

D. Test Results of Interaction Between Market Competition, Marketing Innovation and Corporate Innovation Performance

The LLC and ADF-Fisher tests were used to evaluate *EIP*, *MC*, and *MI* before panel vector autoregressive model estimation. The LLC test results of the three variables were -24.741***, -11.312***, -18.196***, respectively. The ADF-Fisher test results for the variables were 112.431***, 89.157***, and 99.631***, respectively. From the test results, each variable passes the unit root test

and is a stationary sequence. After determining that each variable is a stationary sequence, a co-integration test is carried out to investigate the long-term equilibrium relationship between variables. From the test results, there is a long-term stable equilibrium relationship between market competition, marketing innovation and innovation performance. The above-mentioned variable performance regression analysis uses generalized moment estimation to obtain regression coefficients.

In the module 1 of “Table VI”, the enterprise innovation performance is taken as the dependent variable. It is found

that the market competition and marketing innovation of the lag phase one can improve the innovation performance of the current period and the direct promotion effect of marketing innovation on the innovation performance of the enterprise is greater than that of the market competition the direct promotion of innovation performance. In the module two of "Table VI", the market competition is taken as the dependent variable. The enterprise innovation performance and marketing innovation of the lagging period one can significantly improve the current market competition level, indicating that the current market competition depends on the previous enterprise innovation performance and marketing innovation level; the current market the level of competition also depends on the level of market competition in the previous period. In the module three of Table six, the marketing innovation is taken as the dependent variable. The analysis shows that the enterprise innovation performance of the lag phase one can promote the current marketing innovation; the market competition of the first phase will improve the current level of marketing innovation; the current level of marketing innovation depends on the level of marketing innovation in the early stage. Hypothesis three is verified.

TABLE VI. GMM ESTIMATION RESULTS OF PANEL VECTOR AUTOREGRESSIVE MODEL

| Module area | Module one | Module two | Module three |
|----------------------------|---------------------|--------------------|---------------------|
| <i>variable</i> | <i>EIP</i> | <i>MC</i> | <i>MI</i> |
| <i>sample</i> | overall | overall | overall |
| <i>EIP_{i,t-1}</i> | 0.362 (0.174) | 0.318** (0.008) | 0.032** (0.002) |
| <i>MC_{i,t-1}</i> | 0.265*** (0.027) | 0.341* (0.022) | 0.039* (0.047) |
| <i>MI_{i,t-1}</i> | 0.417*** (0.002) | 0.518** (0.003) | 0.546*** (0.000) |

^a. Noting: ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively.

E. Robustness Test

In this paper, the following methods are used to test the robustness: the innovation performance of enterprises adopts the innovation performance measurement items of Qian Xihong et al. [11] to measure the innovation performance of This paper attempts to reveal the interaction mechanism between market competition, marketing innovation and corporate innovation performance. Through empirical tests on 289 sample companies, the research finds that market competition is an important external influence factor of enterprise innovation performance, and market competition for enterprise innovation. Performance has a positive effect. Different market competition levels have different effects on corporate innovation performance. The incentive effect of market competition on private enterprise innovation performance is greater than the incentive effect of market competition on state-owned enterprise innovation performance. Market competition for high-tech enterprise innovation performance The promotion effect is greater than the promotion effect of market competition on the innovation performance of traditional enterprises; marketing innovation is an important internal influencing factor of enterprise

enterprises. The market competition adopts the measurement of competition degree of Pan Fei et al. [14]. Method, marketing innovation uses Yang Wei et al [6] marketing innovation scale to measure marketing innovation, repeat the above operations, the results of robustness test are shown in "Table VII" and "Table VIII". The results of the robustness test are basically consistent with the previous analysis.

TABLE VII. TEST RESULTS OF MARKET COMPETITION, MARKETING INNOVATION AND FIRM INNOVATION PERFORMANCE

| Variable name | Model one | Model two |
|--------------------------|---------------------|---------------------|
| <i>MC</i> | 0.152** (3.19) | |
| <i>SZ</i> | | 0.162** (3.62) |
| <i>AG</i> | -0.034* (-3.02) | -0.002* (-2.99) |
| <i>constant</i> | -0.001* (-2.92) | -0.004* (-2.98) |
| <i>Adjusted - R2</i> | -0.018** (-3.32) | -0.043** (-3.41) |
| <i>Durbin - Watson</i> | 0.316 | 0.307 |
| <i>F</i> | 1.01 | 1.03 |
| <i>Number of samples</i> | 46.23 | 48.16 |
| <i>MC</i> | 300 | 300 |

^a. Noting: The value of t in parentheses, ***, **, and * indicate significant at the statistical level of 1%, 5%, and 10%, respectively.

TABLE VIII. THE RESULTS OF THE ROBUSTNESS TEST OF THE INTERACTION BETWEEN MARKET COMPETITION, MARKETING INNOVATION AND INNOVATION PERFORMANCE

| Module area | Module one | Module two | Module three |
|----------------------------|--------------------|--------------------|---------------------|
| <i>variable</i> | <i>EIP</i> | <i>MC</i> | <i>MI</i> |
| <i>sample</i> | overall | overall | overall |
| <i>EIP_{i,t-1}</i> | 0.857 (0.661) | 0.182** (0.037) | 0.072** (0.002) |
| <i>MC_{i,t-1}</i> | 0.751* (0.011) | 0.394* (0.027) | 0.026* (0.038) |
| <i>MI_{i,t-1}</i> | 0.298** (0.002) | 0.317** (0.004) | 0.275*** (0.000) |

VI. CONCLUSION

innovation performance, marketing innovation has an improvement effect on enterprise innovation performance, and different levels of marketing innovation have improved the level of innovation performance of enterprises. Differentiation, the effect of marketing innovation on the innovation performance of private enterprises is greater than the promotion effect of marketing innovation on the innovation performance of state-owned enterprises. The effect of marketing innovation on the innovation performance of high-tech enterprises is greater than that of traditional enterprises. Enhance the effect of innovation performance; interactive effect between market competition and marketing innovation and enterprise innovation performance.

The conclusions of this paper have certain theoretical value. This paper establishes a dynamic interaction mechanism model between market competition, marketing

innovation and enterprise innovation performance. This model reveals to some extent the interaction mechanism and path between market competition, marketing innovation and enterprise innovation performance. The research literature is insufficient to explore the mechanism of market competition and marketing innovation affecting innovation performance. The empirical research in this paper finds that there is an interaction between market competition, marketing innovation and corporate innovation performance, which to some extent compensates for the shortcomings of previous empirical research and provides new evidence for the development of market competition theory and marketing innovation theory.

The conclusions of this paper have certain implications for enterprises. For enterprises, fair and just market competition can provide a good external environment for enterprise innovation performance. Market competition is the source of motivation for enterprise innovation. Market competition is the catalyst for enterprise innovation performance; in the era of market competition change, enterprises need to use the system. Thinking to implement marketing innovation and improve marketing innovation requires innovative marketing concepts, innovative marketing methods, innovative marketing models, continuous product innovation, innovative promotion methods and promotion models, and innovative services. Enterprises need to continuously improve their innovation, marketing, and organizational capabilities. Execution ability can support the iterative innovation and fission innovation of marketing, and coordinate the synergy between market competition and marketing innovation. The organic integration of marketing innovation and enterprise capability can improve the innovation performance of enterprises. For the government, formulating relevant support policies to encourage marketing innovation of private enterprises and high-tech enterprises will help supply-side reform and industrial transformation and upgrading.

However, this paper only selected relevant enterprises in some provinces as research samples and obtained some important conclusions. Whether these research conclusions are applicable to other regions remains to be further tested. In addition, the number of research samples is small, and the ability of enterprises to compete in the market, marketing innovation and the mediating effect and regulatory effect between enterprise innovation performances have not been thoroughly investigated. These shortcomings are important directions for future research. In the future, cross-regional large-scale enterprise research will be carried out to further test and develop the research conclusions.

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