Research on the Evaluation Index System of Trust, Innovation and M&A Value

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Abstract. Due to the particular nature of ownership, the motivations for state-owned enterprises to participate in the mixed ownership M&A include not only the realization of corporate capital appreciation and value creation, but also some strategic factors at the national level, such as concentrating state-owned economic power to promote the development of the industry and maintaining stable social development. Based on the characteristics of the self-development of state-owned enterprises and the maximization of interests, this paper constructs the evaluation system of trust mechanism from five dimensions of shareholders’, creditors’, suppliers’, buyers’ and enterprises’ sincerity; constructs the evaluation system of innovation mechanism from three dimensions of technological innovation ability, market competitiveness and sustainable development ability; and the evaluation system of the mixed ownership M&A value of state-owned enterprises from four dimensions of Tobin’s Q, operating cash flow, return on total assets and corporate governance.

1. Introduction

The mixed ownership reform was put forward in the 1990s to introduce private capital and promote the development of productivity. Since the 1990s, China has allowed domestic private capital and foreign capital to participate in the restructuring and reform of state-owned enterprises. The practice of economic reform has proven that mixed ownership can effectively promote the development of productivity. After the reform and opening up in 1992, private capital was officially introduced into China. At present, the idea of mixed ownership as the reform idea of state-owned enterprises is actually a redefinition of the ownership structure of our country, and a new understanding of the role and status of private ownership and private economy in China’s national economic structure. Before the reform, China implemented the policy of eliminating “private ownership”; after the reform and opening up, a small number of individual and private economies were allowed to exist, and private ownership began to appear in China. The 18th National Congress of the Communist Party of China first adopted the term of “encouragement” for the development of non-public ownership. The Third Plenary Session of the 18th Central Committee of the Communist Party of China made clear the equal status of public ownership and non-public ownership, and specifically proposed to “actively develop...
the mixed ownership economy”. It believed that “the mixed ownership economy with cross shareholding and integration of state-owned capital, collective capital and non-public capital is an important form of realization of the basic economic system” and “more state-owned economies and other ownership economies are allowed to develop into mixed ownership economy”. First, state-owned enterprises can obtain strategic opportunities by merging private enterprises. Private enterprises, with their unique forms of ownership, have certain advantages in their operating areas in terms of technology and market resources. The reason why most of the domestic private enterprises failed to develop in the end is that capital, scale and other factors have become the bottlenecks of their development. Most of the state-owned enterprises have relatively strong strength. After merger or reorganization with private enterprises, they can effectively combine their relatively strong economic strength with various resource advantages of private enterprises, so as to quickly enter a relatively unfamiliar industry in a short period of time, make it bigger and stronger, achieve the goal of obtaining greater strategic opportunities, and increase the economic growth point of enterprises. Second, it can enhance the economic strength of state-owned enterprises. After the state-owned enterprises complete the merger and reorganization of private enterprises, through private enterprises, the “springboard”, they can achieve the goal of opening up the market, improving the technical level, inputting funds and completing their own operation and management. Most importantly, it can help the enterprises realize the value preservation and increase of state-owned assets, so as to fundamentally enhance the economic strength of enterprises. Therefore, it is very important to construct the index evaluation system to evaluate the effect of the mixed ownership M&A of state-owned enterprises in China. Around the two core research contents of this book, trust mechanism and innovation ability, this paper will construct the evaluation system of the mixed ownership M&A of state-owned enterprises in China.

2. Trust Mechanism Evaluation System
This paper takes the strategic mixed ownership M&A motivation of state-owned enterprises as the starting point of the research, the trust and innovation in the strategic M&A as the main research path, and the value created by the corporate M&A as the end of the research.

2.1. Evaluation Index of Shareholder Trust
The trust of shareholders stems from their desire to improve M&A performance and to maximize their own interests. M&A market performance is usually divided into short-term and long-term categories.

2.1.1. Market Performance of the Mixed Ownership M&A. The event research method is used to measure the impact of the M&A on shareholders by calculating the changes in the company’s stock abnormal returns after the announcement of the M&A.

(1) Short-term Market Performance. There are usually two indexes for measurement: abnormal return (AR) and cumulative abnormal return (CAR). The calculation steps are as follows: First, determining the window period. Second, calculating the expected return \( E(R) \): \( AR = R - E(R) \), where \( R \) is the actual return of stock, and \( E(R) \) is the expected normal stock return on the assumption that the company does not conduct M&A. Mean Adjusted Returns, Market Adjusted Returns, and Market and Risk Adjusted Returns are three main ways to calculate \( E(R) \). Third, calculating \( CAR = \sum_{t=r_i}^{t_f} AR_t \).

Fourth, calculating average abnormal return \( AAR_{p,t} \): \( AAR_p = \frac{1}{N} \sum_{i=1}^{N} AR_{p,i} \) and \( CAR_{p,t} = \sum_{i=1}^{N} AAR_{p,i} \).

(2) Long Term Market Performance. The calculation of long-term M&A market performance is to select the enterprises matching with the sample enterprises after the M&A and compare the market performance between two enterprises. The specific calculation model is as \( BHAR_{i,t} = \prod_{t=0}^{T} (1 + R_{i,t}) - \prod_{t=0}^{T} (1 + R_{benchmark,t}) \), where \( R_{benchmark,t} = \frac{1}{N} \sum_{j=1}^{N} AR_{p,j} \). Among them, \( BHAR_{i,t} \) is the long-term abnormal return rate of the \( i \)-th acquirer enterprise’s stock; \( R_{i,t} \) is the normal return rate of the \( i \)-th stock
in the $t$-th month; $R_{\text{benchmark}}$ is the average return rate of the control group enterprise’s stock; $AR_{ij}$ is the actual stock return of the $j$-th control group enterprise in the $t$-th month; $N$ is the number of the control group enterprise. In the research of the long-term M&A market performance, scholars generally divide the control group enterprises into five groups based on the enterprise size and the book-to-market ratio, and pair them with sample companies to form 25 investment portfolios.

2.1.2. Financial Performance of the Mixed Ownership M&A. The measurement indexes of the M&A financial performance include ROE and EPS. After the M&A, if the M&A parties can achieve synergy, the input-output function of the production factors of the M&A enterprises will change, and the financial performance of the enterprises will not improve, thus increasing the long-term trust of the acquirer shareholders to state-owned enterprises. Most research believes that state-owned enterprises’ participation in the mixed ownership M&A will improve their financial performance. Megginson et al. (1994) [1] believed that state-owned enterprises had the problem of operating inefficiency, and privatization could improve the efficiency of business operations and have an impact on business performance (Dsouza et al., 2005) [2]. Wang (2016) [3] explored the M&A of the local state-owned enterprise Grandblue under cross-ownership and found that the M&A enhanced the innovation ability of Grandblue, thereby promoting the market performance and financial performance of the enterprise.

2.2. Evaluation Index of Creditor’s Trust

The trust of M&A creditors comes from their demand for sufficient profits and cash flow. Creditors usually judge the debt situation and repayment ability of enterprises through four aspects: capital structure, bond maturity structure, short-term solvency and long-term solvency.

2.2.1. Capital Structure. Jensen and Meckling (1976) [4] pointed out that modern debt financing method may cause conflicts of interest between creditors and shareholders. Shareholders’ interest demands in M&A are to obtain higher returns with as little risk as possible, avoid paying too high M&A premium, realize the rapid growth of M&A enterprise value and owner’s equity, while creditors expect the M&A enterprises to have more sufficient profits and cash flow and can repay the money on time. In China, scholars generally use asset-liability ratio as a measure of the capital structure of listed companies.

2.2.2. Debt Maturity Structure. According to the information of debt term structure owned by state-owned enterprises, creditors can better evaluate the degree to which their own interests are protected. Myers and Majluf (1984) [5] study found that the short-term debt owned by the enterprise can transmit the relevant information of the growth of the enterprise. There are two common methods to evaluate the maturity structure of corporate debt. The first one is the balance sheet method; the second one is the incremental method. In China, scholars mainly use balance sheet method.

2.2.3. The Short-term Solvency of Enterprises. There are four ways to measure: the sustainability of short-term solvency, liquidity ratio, ratio of cash flow to liabilities, and off-balance-sheet factors. Many scholars have studied the short-term solvency of enterprises. By Altman (1968) [6] research method based on financial ratio, a Z-score model was established to warn the financial risks of enterprises. Altman et al. (1977) [7] established a ZETA model, which takes liquidity ratio as an index to evaluate the short-term solvency of enterprises. For the same enterprise sample analysis, the ability to forecast financial risks of the ZETA model should be more accurate.

2.2.4. Interest Rate on Debt. The above methods all focus on the risk of creditors. In addition to the risks faced by creditors, the interests of creditors are also closely related to returns. Eger (1983) [8] studied some American companies and found that M&A helped acquirer creditors to achieve excess returns. Billett et al. (2004) [9] studied 831 M&A events from 1979-1997 and found that M&A made the excess accumulated income of acquirer creditors negative. In China, most listed companies take
bank loans as the main financing channel and measure the income of creditors by financial indexes. Most scholars use the interest payment ratio of listed companies as an index to evaluate the income of creditors, because the cost paid by the debtor is the income of creditors.

2.3. Supplier Trust Evaluation Index
The trust of M&A suppliers mainly comes from their demand that companies have sufficient cash flow, they usually judge this through the turnover of accounts receivable and inventory.

2.3.1. Accounts Receivable Turnover Rate. Accounts receivable have an important impact on the trust of upstream and downstream enterprises in the supply chain (Meng, 2006) [10]. In theory, the turnover rate of accounts receivable = Revenue from business sales on credit / Average accounts receivable balance, but because it is difficult for external stakeholders to obtain credit sales income, it is generally replaced by the main business income. After participating in mixed ownership M&A, if state-owned enterprises can obtain synergy and size effect, learn from the management advantages of private enterprises, have a greater right to speak in their relationship with customers, and the turnover rate of accounts receivable will increase.

2.3.2. Inventory Turnover Rate. Inventory turnover is a key index to measure the production and operation, inventory management and sales level of enterprises. The supplier’s trust in enterprise is based on the timely recovery of funds and the maintenance of the stability of the contract. If after mixed ownership M&A, the state-owned enterprise expands the enterprise size, obtains synergy, can fully combine the advantage of the acquirer (private enterprise), optimize the capital structure of the state-owned enterprise, improve the management ability of the inventory, increase the inventory turnover rate, the supplier’s interest demand is guaranteed stably, it will increase the degree of trust in the M&A enterprise, and form the strategic alliance based on trust with the enterprise, so as to realize the win-win situation between the supplier and the M&A enterprise.

2.4. Evaluation index of buyer’s trust
The trust of customers mainly comes from their demand for M&A enterprises to supply high-quality products and services and personalized products in line with their needs. Buyers usually judge the business situation of enterprise through the growth rate of the business income and the market share.

2.4.1. Growth Rate of Business Income. The growth rate of business income reflects the change of enterprise income relative to the previous year. It is also an important basis for enterprises to make expansion strategy decisions to judge the growth and profitability of enterprises, to evaluate the production and operation status of enterprises, and to forecast the future income growth trend of enterprises. After the M&A, if the state-owned enterprises learn from the management mode and production technology of private enterprises, constantly improve the knowledge creation ability and promote the optimization of production input function of enterprises, the growth rate of business income of enterprises will continue to increase, so customers will increase their trust in enterprises.

2.4.2. Market Share. Market share represents the proportion of sales volume or sales revenue of an enterprise to similar products in the market. Szymanski et al. (1993) [11] found that most researchers believe the size of enterprise market share can promote enterprise profitability. In the process of state-owned enterprises participating in mixed ownership M&A, if the enterprise merger can bring scale effect and synergy effect to the enterprise, the market share of M&A enterprises will increase, which will increase customers’ trust in the enterprise’s products. And the trust of customers will increase their desire for the products of the enterprise, thus helping the M&A enterprise to create more value.

2.5. Evaluation Index of Sincerity
Sincerity can help both M&A enterprises realize resource integration, improve core competitiveness and innovation ability, and have an important impact on their value creation.

2.5.1. Punishment. In order to promote the development of the capital market and provide a fair and open environment for the listing, financing, capital operation, etc. of enterprises, China has promulgated a series of rules and policies, and the internal governance and information disclosure behavior of enterprises are increasingly standardized. But at present, due to the imperfect development of China’s capital market, many companies still have irregular behaviors, such as financial information fraud, insider trading, and information disclosure violations, which are supervised and punished by the regulatory authorities.

2.5.2. Litigation. Enterprise is the key to combine and connect a series of contracts (agreements). The litigation not only causes direct economic loss to the defaulting party, but also produces signal transmission effect. Investors have a sense of distrust of the involved enterprises, which leads to the decline of the stock price of the defaulting company. From a long-term point of view, the long-term litigation will cost the contract parties a lot of energy and transaction costs, and affect the normal operation of enterprises. If the state-owned enterprises don’t fully investigate the contract performance and the pending litigation of the acquiree (private enterprise) before the mixed ownership M&A, and the target company breaks the contract and is sued after the M&A, it will have a great impact on the sincerity image of the whole group and the value creation of mixed ownership M&A.

2.5.3. Information Disclosure Quality. The efficient market hypothesis holds that the stock market is an efficient market when the stock price in the capital stock market fully reflects all the information of the company (Fama, 1970) [12]. Therefore, in order to promote the development and improvement of the stock market, as the party with absolute information advantage, the company should actively and promptly disclose information. China’s “Securities Law” stipulates that listed companies should promptly and accurately disclose information in accordance with the provisions. In the mixed ownership M&A activities of state-owned enterprises, the information disclosure quality of the acquiree (private enterprise) will be an important trust measurement index; similarly, the acquiree will also investigate the information disclosure quality of the acquirer (state-owned enterprise).

2.5.4. Public Denunciations of Executives. In the corporate governance of modern enterprises, shareholders are the owners, while the management manages the daily business affairs of enterprises. Due to the information asymmetry, there is a “principal-agent” problem between them. Generally speaking, the constraints on the behavior of enterprise management will come from four aspects: regulatory authorities, external manager market, internal governance mechanism and internal reputation mechanism. Among the four ways mentioned above, the most severe punishment way is the government department’s public denunciation. In the long run, the lack of corporate governance mechanism with the board of directors as the core will lead to very high M&A integration costs and reduce the long-term book value of the M&A companies.

3. Innovation Mechanism Evaluation System
Innovation is the process of changing, renewing or creating a new product, so as to obtain higher economic or social benefits. Intangible assets (such as patents and technologies) held by enterprises are an important part of enterprise innovation ability, which can reflect the production technology ability, competitive advantage, future development potential and competitiveness in the market of enterprises (Yuan et al., 2012) [13]. Unlike intangible assets, goodwill is unidentifiable and can help enterprises realize excess earnings in the future. It is an intangible resource with special heterogeneity (Du et al., 2011) [14]. Therefore, this paper establishes the enterprise innovation mechanism evaluation system based on intangible assets and goodwill, as shown in Table 1.
Table 1. Enterprise Innovation Mechanism Evaluation System.

| Primary index               | Secondary index               | Measurement method                                                                 |
|-----------------------------|-------------------------------|-------------------------------------------------------------------------------------|
| Technological innovation ability | R&D investment level           | R&D expenditure/ Business income                                                   |
|                             | Proportion of technical intangible assets | Total technical intangible assets/ Total intangible assets                          |
|                             | R&D personnel density          | Number of R&D technicians/ Total number of staff in an enterprise                   |
|                             | Goodwill yield                 | Business income / total goodwill                                                   |
| Market competitiveness      | Brand advantage                | Sales expenses/ Business income                                                     |
|                             | Market share                   | Enterprise sales revenue / sales revenue of the same industry                       |
|                             | Excess return rate             | Net profit rate of enterprise - average net interest rate of industry                |
| Sustainable development ability | Asset growth rate             | (Total assets of current period - Total assets of previous period)/ Total assets of previous period |
|                             | Share of intangible assets     | Total intangible assets / total assets                                              |
|                             | Share of goodwill              | Total goodwill / total assets                                                       |
|                             | Staff quality                  | Number of employees with bachelor degree and above/ Number of active employees       |
|                             | Intangible assets per share    | Total intangible assets/ Number of outstanding shares of common stock               |
|                             | Goodwill per share             | Total goodwill / number of ordinary shares in circulation                            |

3.1. Evaluation of Technological Innovation Ability and Innovation Mechanism
The main influencing factors of enterprises’ technological innovation ability are shown in four aspects, namely R&D investment level, proportion of technical intangible assets, R&D personnel density and goodwill yield. First, R&D investment level. It directly reflects the importance and support of enterprises for innovation activities. Second, proportion of technical intangible assets. It directly reflects the value of core technology of enterprises. Third, R&D personnel density. Talents are the main body of the innovation activities, the users of the core technology and the organizers of the innovation achievements. Fourth, goodwill yield. Goodwill is generated by M&A of the enterprise.

3.2. Evaluation of Market Competitiveness and Innovation Mechanism
The market competitiveness of enterprises mainly depends on three factors, namely brand influence, market share and excess profit rate. First, brand influence. The brand influence of an enterprise plays a decisive role in customer loyalty and enterprise reputation. Second, market share. The market share of an enterprise is a key index reflecting its competitiveness and performance. The larger the market share, the stronger the competitive advantage of the enterprise. Third, the excess profit obtained by enterprises. It can reflect the utilization efficiency of intangible resources, thus reflecting the innovation ability of enterprises. In addition, the excess profit rate of enterprises is available in data.

3.3. Evaluation of Sustainable Development Ability and Innovation Mechanism
The main influencing factors of the sustainable development ability of enterprises are shown in six aspects. First, scale of enterprise assets. It can reflect the growth rate of an enterprise and the basis for the sustainable development of an enterprise. Second, the proportion of intangible assets that can continuously create profits and values. Intangible assets are the source of core competitiveness and product heterogeneity of enterprises, which will directly affect their sustainable development ability. Third, the proportion of goodwill that can create excess profits. Fourth, the quality of enterprise staff. It can reflect the innovation ability, resource allocation and integration ability of an enterprise. Fifth,
the status of intangible assets per share. It reflects the value of intangible assets and the creativity of intangible assets owned by shareholders. Sixth, the status of goodwill per share. It can reflect the creative ability of heterogeneous intangible resources owned by shareholders of tradable shares.

4. M&A Value Evaluation System

In the evaluation system, the value created by state-owned enterprises participating in M&A is the most basic and important part of the evaluation system. Only by establishing the evaluation indexes of M&A value, can we explore the influence path of trust on the M&A value of state-owned enterprises.

4.1. Tobin’s Q

Tobin (1969) [15] proposed Tobin’s Q theory. The specific calculation formula is: \( Q = \frac{MV}{RC} \), where \( MV \) is the market value, and \( RC \) is the replacement cost. Tobin’s Q is a key index to measure whether the asset value is overestimated or undervalued. The Q-ratio theory proposed by Tobin (1969) [15] fully considers the market value and book value of the enterprise. However, although China has completed the non-tradable shares reform, it is still difficult to obtain relevant research data of Tobin’s Q defined by Tobin. In view of this, Chung and Pruitt (1994) [16] proposed an approximate calculation formula, and have verified that the accuracy of this formula to calculate Tobin’s Q is nearly 97%. The specific formula is as \( Q = \frac{MVE + PS + DEBT}{TA} \). MVE is the market value of circulation, PS is the value of preferred shares, DEBT is the net debt, TA is the book value of total assets.

4.2. Operating Cash Flow

According to the priority financing theory, the internal financing cost of an enterprise is the smallest, so the best financing sequence is internal financing, bond financing, and equity financing. Therefore, when investing in projects, the management will give priority to internal financing methods, and operating cash flow is an important source of internal funds (Myers and Majluf, 1984) [5]. Compared with external financing, when enterprises use internal resources to invest in projects, they can obtain specific benefits at a smaller cost, which can create value for the enterprises share price in the capital market will also rise. With the expansion of enterprises and the increase in investment opportunities, the demand for funds is also increasing, and investors will also pay more attention to the assessment of enterprises’ operating cash flow. Therefore, this paper uses the cash flow of business activities after M&A as an index to measure the value creation of mixed ownership M&A of state-owned enterprises.

4.3. Return on Total Assets

In the process of achieving sustainable development, enterprises shall not only consider the realization of corporate goals and the improvement of industry status, but also improve core competitiveness and enhance adaptability to the organizational environment. In the process of evaluating the sustainable development ability of enterprises, many scholars choose the comprehensive index of return on total assets (ROA) as the standard to measure the sustainable development ability of enterprises. \( ROA = \frac{Current \ net \ profit}{Average \ assets} \), it directly reflects the profitability of all the assets of the enterprise and the specific resource utilization efficiency of the enterprise. The higher the ROA, the greater the corporate value. Therefore, this paper uses ROA to measure the M&A value to determine the impact of M&A on corporate value creation and sustainable development capabilities.

4.4. Corporate Governance Capabilities

State-owned enterprises’ participation in mixed-ownership M&A can introduce shareholders of private enterprises to manage the enterprise, improve the failure of internal management and supervision caused by “one-share dominance”, optimize the governance process of the enterprise’s board of directors and board of supervisors, and enhance the enterprise’s corporate governance capabilities (Du et al., 2016) [17]. This paper establishes the evaluation indexes of the corporate governance capabilities of state-owned enterprises after M&A from six dimensions: ownership structure, board of
directors, board of supervisors, risk management and control, information disclosure, and social responsibility performance. The specific design of corporate governance evaluation indexes is shown in Table 2.

### Table 2. Evaluation Index Table of Corporate Governance Ability.

| Primary index               | Secondary index                                      | Measurement method                                                                 |
|-----------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------|
| Ownership structure         | Shareholding ratio of state-owned shareholders       | Number of state-owned shares/ Total enterprise shares                              |
|                             | Equity concentration                                 | The sum of the shareholding ratios of the top 5 largest shareholders               |
|                             | Ownership checks and balances                        | Total shareholding ratio of top 2-5 shareholders/ Shareholding ratio of the largest shareholder |
| Board of directors          | Number of the board of directors                     | Number of the directors in enterprise board                                        |
|                             | Proportion of independent directors                  | Number of independent directors/ Total number of the board members                 |
|                             | Compensation of the board of directors               | Natural logarithm of the total remuneration of the top three board members         |
|                             | Number of meetings of the board of directors         | Number of meetings of the board of directors held in the current period            |
| Board of supervisors        | Number of the board of supervisors                   | Number of corporate board of supervisors                                           |
|                             | Percentage of external supervisors                   | Number of external supervisors/ Total number of members of the board of supervisors |
|                             | Number of meetings of the board of supervisors       | Number of meetings of the board of supervisors held in the current period          |
| Risk management and control | Completeness of internal control                     | Enterprise Internal Control Index in Dibo Database                                  |
| Information disclosure      | Audit opinions                                       | If the audit opinion is a standard unqualified opinion, it is 1, otherwise it is 0  |
|                             | General Information Meeting                          | Does the company disclose the details of the shareholders meeting, if it is disclosed, marked as 1, otherwise it is 0 |
| Performance of social      | Tax situation                                         | Income tax expenses/ Total profit                                                 |
| responsibilities           | Donation situation                                   | Donation expenditure/ Business income                                             |

### 5. Empirical Research Models

#### 5.1. OLS Linear Regression Model

The Ordinary Least Squares (OLS) model is an important method to evaluate the performance of corporate M&A. The basic principle of regression is to find the best matching function by minimizing the sum of squares of errors. According to this basic principle, the best fit straight line is expressed as

\[ y = \hat{\alpha} + \hat{\beta} x, \]

where \( \hat{\alpha} \) and \( \hat{\beta} \) are the estimated values of \( a \) and \( \beta \), \( y \) is the regression fitting value, \( \hat{u} \) is the difference between the fitted value and the actual value, that is, the estimated value of the random error term \( u \). Taking the performance evaluation indexes of M&A as the explanatory variables, and the evaluation indexes as the explanatory variables can explore the impact of trust and innovation mechanisms on the M&A performance through the OLS model.

#### 5.2. Multivariate Discriminant Analysis Model
The discriminant analysis method is to screen out the characteristic variables that meet the research objectives from the various variables of the sample enterprises, and then classify and predict the research samples by establishing a discriminant function. Altman (1968) [6] analyzed the corporate financial crisis based on discriminant analysis, and selected five indexes including total assets, sales revenue, operating capital, undistributed profits, and liabilities to calculate the Z-score, and established a corporate financial crisis probability model. Altman et al. (1977) [7] improved this model and established the Zeta discriminant analysis model. In the M&A activities, the trust level of enterprises is firstly constructed based on the Z-score and Zeta models, and the relationship between corporate trust and state-owned enterprises’ M&A performance is studied; then innovation variables are further added to analyze the changes in the relationship between trust and M&A performance, which is an extension of the study of discriminant analysis (Zhang and Zhu, 2012) [18].

5.3. Logistic Regression Model
Press and Wilson (1978) [19] first proposed the Logistic model. The basic settings of the Logistic model are as $P=1/(1+e^{-v})$. $y$ is the characteristic variable in the evaluation process of the economic consequences of the enterprise, and the calculation formula is $y = C_0 + \sum_{i=1}^{n} C_i X_i$; $P$ is the probability of a certain type of economic consequences, and the value range is between 0 and 1. In evaluating the M&A value, we can set the M&A as virtual variables according to the success or failure of M&A and integration of state-owned enterprises, and explore the influence of innovation or trust mechanism on M&A through Logistic model; we can also divide the sample enterprises into two groups according to the innovation or trust degree evaluation index of the enterprises, and compare the difference of the M&A performance between the control group and the experimental group, so as to explore the influence of trust or innovation mechanism on the value creation of state-owned enterprises.

5.4. Probit Regression Model
Barth and Brumbaugh (1989) [20] first proposed Probit regression model. Probit model is a generalized linear regression model. Assuming that the probability of enterprise obeying normal distribution and having certain economic consequences is $P$, the $P$-quantile of probability function can be explained by the influencing factors of economic consequences. Probit model and Logistic model have very similar calculation ideas. Compared with Probit model, Logistic model is more widely used. In the research of evaluating the M&A value creation, if the dependent variable is a sequential variable (such as scoring the M&A performance of state-owned enterprises from 1 to 10 points), the regression can only use Probit model instead of Logistic model; if the characteristic value of the variable is not fully revealed, for example, the R&D expenditure is kept confidential by the enterprise, and it is not willing to publicly disclose it prematurely, Probit model can be used to calculate the value of estimated variables, which makes the research on the impact of trust or innovation on the value creation of mixed ownership M&A of state-owned enterprises more detailed and in-depth.

5.5. Cluster Analysis Model
The calculation of cluster analysis method is mainly divided into three steps. Firstly, sorting the samples or variables according to similarity; secondly, the gravity center method and others are used to calculate the initial classification and gathering point of the research sample year; thirdly, in the process of variable clustering, specific scale variables are selected as “distance”, and the cluster analysis is carried out by Euclidean, Minkovski and other distance formulas according to the specific situation. The purpose of cluster analysis is to make the similarity of the same group of variables the strongest, so that the heterogeneity of different groups of variables is the strongest. It is mainly used in the case that the evaluation index does not obey the specific distribution characteristics. In the mixed ownership M&A of state-owned enterprises, we can cluster and group the samples according to the trust and innovation degree, so as to explore the influence of trust or innovation degree on M&A value.
5.6. Structural Equation Model

Structural equation model is mainly used to verify a certain theory. It will first put forward a theoretical structure of pre-hypothesis, and verify whether the theoretical structure of pre-hypothesis is true by collecting and sorting data. The specific calculation idea is to select some variables that can’t be directly observed but are expected to explore as potential variables; then, the variables that can be directly observed and measured are selected as the measurement method of potential variables, so as to establish the relationship between direct variables and potential variables, namely structure. Structural equation model consists of measurement and structural models.

(1) Measurement model. It is used to explore the relationship between observed variables and potential variables. The specific model is set as \( x = A_1 \xi + \delta \), \( y = A_2 \eta + \epsilon \). Where, \( x \) is the exogenous observed variable matrix; \( A_1 \) is the load matrix of the exogenous observed variable; \( \xi \) is the exogenous potential variable; \( y \) is the endogenous observed variable matrix; \( \eta \) is the endogenous potential variable; \( A_2 \) is the load matrix of the endogenous observed variable; \( \delta \) and \( \epsilon \) are model residuals.

(2) Structural model. It is usually used to analyze the relationship between potential variables. The specific model is as \( \eta = \lambda \eta + \Gamma \xi + \zeta \). Where, \( \lambda \) is the influence effect coefficient between the endogenous potential variables; \( \Gamma \) is the influence effect coefficient of the exogenous potential variable on the endogenous potential variable; \( \zeta \) is the residual matrix. The structural equation model can be applied to the multi-dimensional evaluation and analysis of enterprise M&A performance (Zhao and Zhang, 2013) [21]. In the evaluation of the M&A performance, we can select variables from multiple dimensions as the measurement indexes for the innovation mechanism, trust mechanism, and the value creation of mixed-ownership M&A, and analyze and explore the impact of trust and innovation mechanisms on the value creation of mixed-ownership M&A through structural equation model.

6. Case study Model Based on Balanced Scorecard

The balanced scorecard was first proposed by Kaplan and Norton (1992) [22], is a comprehensive system for evaluating corporate performance and strategic management performance. Its design process is determining the corporate vision and goal, establish an appropriate performance evaluation system, and formulate specific scoring rules and methods for the performance evaluation system. The balanced scorecard involves four dimensions: finance, customer, internal operation, learning and growth. According to the characteristics of state-owned enterprises’ mixed-ownership M&A, this paper has set up different index evaluation systems from four dimensions, as shown in Table 3.

| Dimension         | Evaluation index                        | Measurement method                                                                 | Index symbol |
|-------------------|-----------------------------------------|------------------------------------------------------------------------------------|--------------|
| Financial         | Net interest rate of owners’ equity      | Net profit / owner’s equity                                                        | Positive     |
|                    | Equity ratio                            | Liabilities / owner’s equity                                                       | Positive     |
|                    | State-owned capital appreciation rate    | (Owner’s equity at the end of the year-capital reserves increased due to objective factors) / owner’s equity at the beginning *100% | Positive     |
|                    | Social contribution value per share      | Earnings per share + (total tax payments + employee expenses + interest expenses + public welfare expenses - social costs) / average number of shares | Positive     |
| Customers         | Market share                            | Enterprise sales revenue / industrial average sales revenue of products of the same kind | Positive     |
|                    | Complaint resolution rate               | Number of complaints resolved at current period / total number of complaints        | Positive     |
|                    | Customer retention rate                 | Number of customers who still complete transactions in the current period after that in the | Positive     |
In the M&A performance evaluation, we can select representative state-owned enterprise participating as cases. Aiming at the vision and goals of mixed ownership M&A of state-owned enterprises, a series of evaluation targets and index are established from four dimensions including finance to explore the mixed ownership M&A performance of state-owned enterprises. This paper will also conduct a specific analysis of companies based on their trust and innovation degrees, and explore the impact of trust and innovation on the mixed ownership M&A performance of state-owned enterprises.

7. Summary
This paper establishes an evaluation system and related test models for trust, innovation, and value creation of mixed ownership M&A of state-owned enterprises. According to the source of trust, enterprise trust mechanism can be divided into internal trust mechanism and external trust mechanism. The external trust mechanism is constructed on the basis of the realization of the interests of stakeholders, and the enterprise internal trust mechanism is built on the basis of the sincerity of M&A parties. Innovation is the process of changing, renewing or creating a new product to obtain higher economic or social benefits. This paper evaluates the enterprise innovation from the perspective of technological innovation capability, market competitiveness, and sustainable development ability. In the evaluation system, the value created by state-owned enterprises participating in M&A is the most basic and important part of the evaluation system. This paper designs and establishes an evaluation system for the value creation of mixed ownership M&A of state-owned enterprises from the four dimensions, including Tobin’s Q, operating cash flow, return on total assets, and corporate governance ability. In terms of the establishment of research models, according to the type of research, this paper divides the research models into empirical research models and case study models. By analysing the realization of the trust or innovation mechanism in the mixed ownership M&A strategy of state-owned enterprises by comparing the difference between the actual value and the target value.

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