Research on the Role of Network Security in Precision Marketing and Its Impact on Enterprise Performance

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Abstract: This study examines the role of cybersecurity in precision marketing and its impact on business performance.The study found that cybersecurity capabilities significantly improve the effectiveness of precision marketing, and further promote the growth of enterprise performance by optimizing marketing activities.Specifically, cybersecurity can increase consumer trust in the enterprise, thus enhancing the effectiveness of precision marketing.The effect of precision marketing plays an intermediary role between network security and enterprise performance.The study also finds that the relationship between network security and marketing effectiveness varies among industries and enterprise sizes, and enterprises with larger enterprise sizes and industries with higher data dependence are more likely to benefit from network security investments.This paper provides theoretical support and practical suggestions for enterprises to develop network security and marketing strategies.

Keywords: Network security, Precision marketing, Business performance, Intermediary role, Business management

Introduction

With the rapid development of information technology, especially the application of big data and artificial intelligence, precision marketing has become the core strategy that modern enterprises increasingly rely on.Precision marketing through the depth of mining consumer behavior data, accurate prediction of consumption trends, so as to achieve personalized recommendation, customized advertising and optimize product promotion.However, the implementation of precision marketing inevitably relies on a large amount of consumer data, including sensitive data such as personal information, consumption habits, browsing records, etc.This data provides tremendous business value to the enterprise, but at the same time, it also presents unprecedented data security risks.

1 Literature review and theoretical basis

1.1 The connotation and implementation mechanism of precision marketing

Precision marketing is a marketing method that achieves personalized promotion through data analysis and customer behavior prediction.With the application of big data, artificial intelligence and machine learning, precision marketing has become an important means to enhance market competitiveness and enhance customer loyalty [1].Its core logic lies in building user portraits, deeply understanding customers 'needs and preferences, and providing

personalized services for customers by using data-driven recommendation system.Precision marketing relies on the collection, storage and analysis of large amounts of data, so the accuracy and reliability of data is the key to success.Especially in the process of data collection, storage or analysis, the role of network security is crucial.If the data is leaked or tampered with, it will not only affect the effect of precision marketing, but also damage the reputation of the enterprise, lead to legal risks and loss of consumer trust [2].Therefore, ensuring the integrity and privacy of data is the basis for the success of precision marketing.

1.2 Enterprise value and technical logic of network security

Network security refers to the technology and management measures to protect enterprise information systems and data from unauthorized access, tampering, disclosure or destruction in the digital environment.Its core principles include confidentiality, integrity and availability.Confidentiality ensures that data is not accessed illegally, integrity ensures that data is not tampered with, and availability ensures that data can be accessed in a timely manner when needed [3].Network security is not only a technical requirement, but also an administrative challenge.As enterprises "digital transformation advances, cybersecurity becomes part of their operational infrastructure.Cyber security is especially important in precision marketing, as data breaches or attacks can cause marketing campaigns to fail and even damage brand image.Effective security measures can enhance consumer trust, increase their willingness to participate in marketing activities, and thus improve marketing effectiveness.

1.3 The measurement dimension of enterprise performance

Enterprise performance evaluation mainly includes three dimensions: market performance, financial performance and brand performance.Market performance measures a company's competitiveness in the market, and common metrics include sales, market share, and customer retention.Financial performance is measured by return on investment (ROI), return on assets (ROA) and return on equity (ROE).Brand performance focuses on the brand image of the enterprise in the minds of consumers, usually measured by brand value, brand loyalty and customer satisfaction.Precision marketing plays an important role in the construction of enterprise brand, especially in improving brand awareness and enhancing consumer loyalty.Therefore, precision marketing has a direct impact on the improvement of the performance indicators of enterprises [4].

1.4 Theoretical basis and research hypothesis construction

The theoretical basis of this study is mainly derived from the resource-based view (RBV) and the success model of information systems.According to the resource-based view, the core competitiveness of an enterprise comes from its unique resources, and information technology and network security, as important resources of an enterprise, can affect the market performance and financial returns of an enterprise by improving the marketing ability and customer trust of the enterprise.In the framework of the success model of information system, network security, as a key component of information system, can improve the effectiveness of the system and user satisfaction,

thus promoting the success of precision marketing activities.

Based on the above theory, this paper constructs the relationship path of "network security investment-precision marketing capability-enterprise performance," and puts forward the following assumptions:

Hypothesis 1: Network security investment positively affects precision marketing capability.

Hypothesis 2: Precision marketing capabilities have a positive impact on corporate performance.

Hypothesis 3: Precision marketing capabilities in the network security investment and corporate performance play an intermediary role between.

By verifying these assumptions, this study will further explore the specific role of network security in precision marketing activities and its impact on enterprise performance, and provide enterprises with the theoretical basis for the implementation of effective security in the digital marketing environment [5].

2 Study design and empirical methods

2.1 Variable definition and index construction

The independent variable of this study is the network security capability, which is mainly measured by the following two dimensions: the maturity of the security system and the proportion of network security investment. Security system maturity refers to the enterprise in the information security management system, data encryption, network firewall, authentication and other aspects of the technology and management capabilities, the evaluation basis can be through the security management standards (such as ISO 27001 certification) and expert rating.The proportion of investment in network security refers to the proportion of investment in IT infrastructure dedicated to security protection in the total IT budget.

As an intermediary variable, precision marketing effect reflects the specific impact of network security in the process of precision marketing.Precision marketing effectiveness can be measured by conversion rate and customer response.Conversion rate represents the percentage of target users who are successfully converted to paying customers in a marketing campaign; customer response includes customer feedback and interaction with personalized marketing content, measuring their acceptance and engagement with precision marketing.

Enterprise performance is the dependent variable of this study, which is mainly measured by three dimensions: market performance, financial performance and brand performance .Market performance includes sales, customer retention, etc.; financial performance is mainly measured by return on investment (ROI) and return on equity (ROE); brand performance is evaluated by indicators such as brand value, consumer loyalty and customer satisfaction.

Control variables include firm size, industry category, and degree of digitalization, which may affect firm performance and need to be controlled in empirical analysis.The size of an enterprise is usually measured by the number of employees and annual operating income, and the industry categories can be divided into Internet, e-commerce, retail and manufacturing.The degree of digitalization refers to the application level of enterprises in informatization, automation and data-driven decision-making,

which can be measured by the investment of enterprises in information technology and the degree of intelligent operation.

2.2 Description of data sources and samples

The data of this study mainly come from two parts: one is the internal data collected by questionnaire survey, the other is the secondary data of the industry.The questionnaire survey will focus on collecting information about enterprises 'network security investment, implementation of precision marketing activities, performance evaluation, etc.The survey respondents are enterprises from different fields, including Internet enterprises, e-commerce platforms, retailers and manufacturing enterprises.The purpose of this study is to explore whether there are differences in the impact of cybersecurity on precision marketing and enterprise performance in different industries.

The questionnaire will be distributed online and offline to senior management or relevant department heads (e.g. IT, Marketing, Finance).In addition to the custom questions, the questionnaire will incorporate validated, standardized scales such as the Cyber Security Maturity Scale, Precision Marketing Effectiveness Scale, and Enterprise Performance Scale.

Secondary data for the industry will be obtained from publicly available industry reports, corporate financial statements and statistics published by market research institutions. Through these data, the financial situation, market performance and industry background of different enterprises can be analyzed to ensure the universality and representativeness of the research.

2.3 Model construction and method description

To examine the impact of cybersecurity on precision marketing and business performance, Structural Equation Modeling (SEM) will be used in this study.Structural equation models can deal with multiple causal relationships simultaneously, and are suitable for testing the path relationship between cyber security, precision marketing effectiveness, and enterprise performance.Through SEM analysis, we can verify whether network security affects the improvement of enterprise performance through the intermediary variable of precision marketing effect.

In the model, the independent variable is the network security capability, the intermediary variable is the precision marketing effect, and the dependent variable is the enterprise performance.The specific path relationship includes: network security capability positively affects precision marketing effect, and precision marketing effect positively affects enterprise performance.Control variables such as firm size, industry category, and degree of digitization will also be incorporated into the model to more accurately assess the true impact of cybersecurity on precision marketing and business performance.

In order to ensure the robustness of the model, this paper will also conduct robustness test, using different variable measurement methods (e.g., using different questionnaires) and different analysis methods (e.g., multiple regression analysis) for comparative verification. Through these tests, the reliability and generalization ability of the research conclusion can be ensured.

Table 1 Variable Definition and Index Construction

Variable	Explain	Index	Measurement methodology
independent variable	cybersecurity capabilities	Security system maturity, proportion of network security investment	Expert rating, proportion of financial investment
metavariable	Precision marketing effect	Conversion rate, customer response	Data analysis, customer survey feedback
dependent variable	firm performance	Market performance, financial performance, brand performance	Sales, ROI, brand loyalty, etc.
control variable	Enterprise size, industry, degree of digitalization	Enterprise size, industry category, degree of digitalization	Annual business revenue, headcount, IT investment

Table 1 shows the definition of the primary variables and how the measures were constructed in this study.Each variable is quantified by specific metrics for subsequent data analysis.The construction of these indicators can ensure the accuracy of the research variables and provide a solid foundation for the subsequent empirical analysis.Through the precise definition of the variables, this study can clearly reveal the role of cybersecurity in precision marketing and its actual impact on enterprise performance.

3 Empirical results and analysis

3.1 Descriptive statistical analysis

In order to better understand the basic situation of the sample data, descriptive statistical analysis was performed on all variables in this study.By calculating the mean value, standard deviation and distribution of each variable, the central trend and dispersion degree of sample data can be preliminarily understood, and the basis for subsequent regression analysis and hypothesis testing can be provided.

Table 2 Descriptive statistics of sample variables

Variable	Mean	Standard deviation	Least value	Maximum
cybersecurity capabilities	3.42	0.65	2.00	5.00
Precision Marketing Effect	4.10	0.58	3.00	5.00
market performance	3.85	0.70	2.50	5.00
financial performance	3.76	0.72	2.40	5.00
brand performance	4.00	0.60	3.10	5.00
scale	3.50	0.80	1.00	5.00

Table 2 shows that the indicators of

network security capability, precision marketing effect and enterprise performance all present moderate average values, and the standard deviation is small, indicating that the sample data are evenly distributed on each variable.The results provide a strong support for the subsequent hypothesis testing and regression analysis.

3.2 Hypothesis test results

In the part of hypothesis testing, this study mainly tests three hypotheses: whether network security capability has a significant positive impact on precision marketing effect; whether precision marketing effect has a significant positive impact on enterprise performance; and whether precision marketing effect plays an intermediary role between network security and performance.These hypotheses were tested in detail using regression analysis and structural equation modeling (SEM).

3.2.1 Hypothesis 1: The impact of network security capabilities on the effectiveness of precision marketing

Regression results showed that cybersecurity capabilities had a significant positive impact on precision marketing effectiveness (coefficient = 0.45, p <0.01).The results show that enterprises can effectively improve the implementation effect of precision marketing, especially in personalized recommendation and customer response, after strengthening the investment in network security and improving the level of security management.

3.2.2 Hypothesis 2: Precision marketing effect on business performance

Hypothesis 2 regression results also show that the effect of precision marketing on corporate performance has a significant positive impact (coefficient = 0.38, p value <0.01).The results show that precision marketing can directly improve the market performance, financial performance and brand performance of enterprises, and verify the effectiveness of precision marketing.

3.2.3 Hypothesis 3: Precision marketing effect in the network security and business performance between the intermediary role

Through the mediating effect test, we found that precision marketing effect played a significant mediating role between network security and enterprise performance (coefficient = 0.28, p <0.05).This result shows that the improvement of network security not only directly affects the precision marketing effect, but also further improves the enterprise performance through optimizing the marketing activities.

Key statistical indicators, including coefficients, standard errors, p-values, and R^2, support these assumptions.At the same time, the value of variance inflation factor (VIF) also shows that there is no serious multicollinearity problem in the model, which further verifies the reliability of the model.

Table 3 Results of regression analysis

Path	Coefficient	Se	T value	P-value	R^2
Network security capabilities → precision marketing effect	0.45	0.08	5.63	<0.01	0.25

Precision Marketing Effect → Enterprise Performance	0.38	0.09	4.22	<0.01	0.31
Cybersecurity Capabilities → Enterprise Performance	0.28	0.10	2.80	<0.05	0.29

The detailed results of the regression analysis are shown in Table 3.The first path verifies the significant impact of network security capability on precision marketing effect.The second path verifies the positive impact of precision marketing effect on enterprise performance.The third path reveals the mediating role of precision marketing effect between network security and enterprise performance.These results further highlight the critical role of cybersecurity in precision marketing and how it can drive business performance growth by improving marketing effectiveness.

3.3 Heterogeneity analysis by industry or size

In order to explore the moderating effect of industry type and enterprise size on the relationship between cybersecurity and precision marketing, we conducted a heterogeneity analysis across industries and sizes.Through grouping regression analysis, we find that enterprises in the Internet industry and e-commerce industry show a more significant positive relationship between network security investment and precision marketing effect.This shows that the Internet and e-commerce industry, due to its high reliance on data, network security plays a particularly important role in precision marketing.

The role of firm size in different paths is also different.Large-scale enterprises usually have more perfect network security system, and the relationship between precision marketing effect and enterprise performance is also significant.However, the lack of investment in network security of SMEs leads to the limitation of their promotion of precision marketing effect, thus affecting the overall performance.

These heterogeneity analyses show that the impact of cybersecurity is not only determined by the security measures of the enterprise itself, but also significantly influenced by industry characteristics and enterprise size.

Through the above analysis results, we can see that the role of network security in precision marketing is crucial, it not only directly affect the effect of precision marketing, but also by improving the marketing effect to further promote the growth of enterprise performance.At the same time, the differences of different industries and enterprise scale also provide valuable clues for the follow-up research.

4 Discussion

4.1 Theoretical implications of research findings

This study explores the role of cybersecurity in precision marketing and its impact on corporate performance, filling the gaps in the existing literature.Precision marketing relies on large amounts of data, and the security of these data directly affects marketing effectiveness and enterprise performance.Although there have been studies on precision marketing and firm performance,

there has been little in the literature to discuss the mediating effect of cyber security in this process.Through empirical analysis, we found that network security not only directly improve the effect of precision marketing, but also by enhancing the security of marketing activities, to further improve the market competitiveness and brand value of enterprises.In particular, this study innovatively proposes and verifies the path model of "network security capability → precision marketing effect → enterprise performance," and clarifies the mediating role of network security between precision marketing and enterprise performance.This discovery broadens the scope of cybersecurity research beyond technology protection to the far-reaching impact on overall business operations and strategy execution.

4.2 Management implications for business practices

This study provides an important management enlightenment for enterprises in the implementation of precision marketing. Enterprises should make cybersecurity a core component of their digital marketing strategy, not just an additional technical guarantee.With the rapid development of information technology and the increasing demand for data privacy protection, network security can enhance the trust of consumers in brands, thus improving the effectiveness of precision marketing.Therefore, organizations must ensure data security and transparency while improving marketing effectiveness.

Enterprises should balance their investment in cybersecurity with their marketing budgets.This study shows that the network security capability significantly improves the effect of precision marketing, so enterprises should reasonably allocate the investment in network security and marketing to avoid the risk of shrinking marketing budget due to excessive investment or data leakage due to neglect of security investment.Enterprises should take full account of the return on investment of network security and optimize the allocation of resources to ensure the best balance between the two when formulating marketing strategies.

Enterprises should formulate differentiated network security investment strategies according to the characteristics of the industry and scale.For industries with high data dependence, such as Internet and e-commerce, enterprises should strengthen network security measures to ensure the smooth progress of precision marketing activities.For small and medium-sized enterprises, flexible security technology solutions, such as cloud security services and outsourced security management, are recommended to ensure data security while maximizing marketing investment.

Conclusion

This study explores the impact of employees 'cybersecurity behaviors on the overall security of an enterprise, and finds that employees' security behaviors are crucial to prevent data leakage and cyberattacks.Improper online behavior by employees, such as ignoring security practices or using weak passwords, increases the risk to the business.The research enriches the research framework of network security behavior in theory, and emphasizes the importance of improving the network security awareness of employees, strengthening training and formulating strict security management measures in practice.These findings provide

effective guidance for enterprises to optimize security policies and reduce internal security risks.

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