

Research on the Application of Mathematical Statistical Methods in Enterprise Economic Analysis

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Abstract. The application of mathematical statistical methods in the economic analysis of enterprises involves a wide range of research fields. Economic analysis requires the collection and processing of large amounts of data in order to evaluate the performance of the business, analyze market trends, and forecast future developments. Mathematical statistical methods provide a powerful tool for business economic analysis, which can help companies extract useful information from large amounts of data and make decisions based on statistical inference. The purpose of this paper is to explore the application of mathematical statistical methods in the economic analysis of firms and the impact of these methods on firms' economic decision-making.

Keywords: Mathematical statistics, statistical methods, enterprise, economic analysis.

1. Introduction

In today's competitive business environment, businesses need to have an accurate and timely understanding of market conditions and internal operations in order to make informed decisions. With the rapid development of information technology, enterprises are able to collect and store large amounts of data, but how to extract useful information from this data is still a challenge. Mathematical statistical methods may provide an effective analytical tool for companies to understand and utilize the internal patterns of data [1].

Mathematical statistical methods refer to methods that apply mathematical and statistical principles and methods to analyze and interpret data. Mathematics itself has the characteristics of theory and abstraction, and has been widely used in many fields such as machinery, economics, and engineering construction. There is a close relationship between mathematics and economic analysis, and in the process of qualitative and quantitative analysis of enterprise economy, the commonly used mathematical statistical methods include quantitative analysis, average analysis, equilibrium analysis, overall observation, projection estimation, etc. The application of mathematical statistical methods in the economic analysis of enterprises can help enterprises to formulate clear economic development goals, adjust the current production and operation plans of enterprises, formulate scientific and reasonable development decisions, realize the supervision and control of the entire business process, and comprehensively improve the market competitiveness of enterprises. Through the application of mathematical and statistical methods, companies can conduct market research, sales forecasting, and other analyses to improve competitiveness and achieve sustainable development [2]. This paper will study the application of mathematical statistical methods in enterprise economic analysis, aiming to promote the further application and development of mathematical statistical methods in enterprise economic analysis.

2. The Application Value of Mathematical Statistical Methods in Enterprise Economic Analysis

2.1. Help enterprises to conduct data analysis

In the economic analysis of a business, mathematical statistical methods can be used to analyze and interpret the economic data of a business to support decision-making. By applying statistical principles and methods, enterprises can collate, summarize and describe a large amount of economic

data, revealing correlations and trends between data. This kind of data analysis helps enterprises understand key information such as market demand, customer behavior, and product sales, and helps enterprises make more accurate and scientific decisions, such as market positioning, product pricing, marketing strategies, etc.

2.2. Help enterprises to carry out risk management

Mathematical statistical methods have important application value in enterprise risk management. Through statistical analysis of historical data and market changes, companies can identify potential risk factors and assess risks through mathematical models and risk assessment methods. For example, with value-at-risk models and Monte Carlo simulations, companies can assess the risk level of a portfolio to support investment decisions. In addition, mathematical statistical methods can also be used to establish risk early warning models to detect and respond to potential risk events in advance, so as to help enterprises reduce losses and enhance their ability to resist risks.

2.3. Help enterprises to statistically model and predict economic trends

In enterprise economic analysis, mathematical statistical methods can be used to build economic statistical models and forecasting models to predict future economic trends and market trends. By collecting and analyzing relevant economic indicators and market data, companies can apply statistical modeling methods such as regression analysis and time series analysis to build forecasting models. These models can help enterprises predict key indicators such as market demand and sales trends, and provide a scientific basis for strategic decision-making. The application of forecasting models can help enterprises make decisions in sales forecasting, inventory control, etc., and improve the operational efficiency and market competitiveness of enterprises.

2.4. Help enterprises optimize decision-making and resource allocation

Mathematical and statistical methods play an important role in optimal decision-making and resource allocation in enterprises. By establishing mathematical models and applying optimization algorithms, enterprises can determine the optimal decision-making scheme and resource allocation strategy. For example, in production planning, companies can use mathematical optimization methods such as linear programming and integer programming to make the most reasonable decisions while considering factors such as production costs, resource constraints, and market demand while seeking the most profitable output. In addition, mathematical and statistical methods can also be applied to supply chain management. After modeling and analyzing the supply chain network, companies can use operations research methods, such as supply chain optimization and inventory control models, to analyze how to meet customer needs while minimizing inventory costs and transportation costs, which can help companies achieve efficient operation of the supply chain and efficient use of resources [3].

3. Factors Restricting the Application of Mathematical Statistical Methods in the Enterprise Economy

3.1. Lack of a sound data and statistics system

The lack of a sound data statistics system is an important factor restricting the application of mathematical statistical methods in the enterprise economy. Many enterprises have deficiencies in data statistics, which brings a series of problems to the economic analysis and decision-making of enterprises. First of all, the lack of a sound data statistics system leads to difficulties in data collection. The collection of enterprise economic data is the basis of data statistics, but due to the lack of standardization and systematization, enterprises cannot collect the necessary data accurately and timely, which will lead to incomplete data or errors, affecting the comprehensive assessment and accurate analysis of the economic status of enterprises. Secondly, the lack of a sound data statistics

system leads to the inability to effectively guarantee the quality of data. Data quality is the premise and guarantee of data statistical analysis, but in the absence of a standardized statistical system, the accuracy, consistency and reliability of data cannot be effectively monitored and controlled. Inaccurate or problematic data can lead companies to draw wrong conclusions in economic analysis, which can negatively impact decision-making. Finally, the lack of a sound statistical system also affects the efficiency and depth of data analysis. A sound statistical system should clarify the standards and processes of data statistics, so that the collection, collation and analysis of data can be carried out efficiently. However, the lack of a standardized and systematic statistical system will lead to cumbersome and inefficient data processing, which will affect the timeliness and comprehensiveness of data analysis. This can lead to companies missing out on market opportunities or being unable to respond effectively to economic risks [4].

3.2. The quality of data statistics needs to be improved

The quality of data statistics is the basis of enterprise economic analysis, and only when the quality of data statistics is guaranteed, can we better understand the economic status of enterprises and provide scientific basis for enterprise decision-making. However, many enterprises have quality problems in data statistics at present, which are mainly manifested in the following aspects. First of all, many enterprises have problems such as inaccurate and incomplete data in data statistics, which lead to the inability to guarantee the quality of work in data statistics, and it is difficult to conduct a comprehensive and accurate analysis of the economic status of enterprises. Therefore, enterprises need to strengthen the quality control of data statistics to ensure the accuracy and completeness of data. Secondly, there are human errors and non-standard operations in the process of data collection and collation. In business economic analysis, the accuracy and reliability of data are essential to draw the right conclusions. However, the interference of human factors, such as data entry errors and unscientific data collection methods, will lead to the deterioration of data statistical quality. Finally, the issue of statistical quality also involves the rationality of sample selection and sampling methods. In the economic analysis of enterprises, the selection of samples plays an important role in the reliability of the results. If there is a bias in the selection of samples or the sampling method is not scientific, it will lead to the distortion of the statistical results, which will affect the analysis and judgment of the economic status of the enterprise [5].

3.3. The level of mathematical statistics is insufficient

Mathematical statistics is an important tool for enterprise economic analysis, and only by mastering mathematical statistical methods can we better understand the economic status of enterprises and provide scientific basis for enterprise decision-making. However, many enterprises have the problem of insufficient level of mathematical statistics, which is mainly manifested in the following aspects. First of all, many companies lack professionals in mathematical statistics. Mathematical statistics requires professional skills and knowledge, but many enterprises lack professional mathematical statistics talents, resulting in the quality of mathematical statistics work cannot be guaranteed. Secondly, many enterprises lack effective tools and software support in mathematical statistics. Data analysis of mathematical statistics usually requires the help of professional statistical software or programming languages, such as Python, SPSS, etc. However, many enterprises lack these statistical software, resulting in the efficiency and quality of mathematical statistical work cannot be guaranteed. The lack of suitable tools and software limits the processing of large-scale data and the application of complex models and algorithms. Finally, the lack of mathematical statistics can also lead to difficulties in the interpretation and application of data analysis results. Mathematical statistical methods involve complex models and algorithms, which need to be interpreted and applied to the actual business. If companies lack the ability to understand and interpret mathematical statistical methods correctly, it can lead to misinterpretation or misapplication of data analysis results, leading to inaccurate decision-making [6].

4. Effective Measures for the Application of Mathematical Statistical Methods in Enterprise Economic Analysis

4.1. Construct a scientific and systematic management system for mathematical statistics to improve the accuracy of mathematical statistics

In order to make full use of mathematical statistical methods for enterprise economic analysis, enterprises can take the following effective measures to build a scientific and systematic mathematical statistics management system to improve the accuracy of mathematical statistics. Firstly, develop a guidance document for data standardization and normalization. By formulating detailed data statistics standards and specifications, the company clarifies the definition and calculation methods of various indicators to ensure that different departments and positions have the same understanding and processing methods of data. For example, companies can develop clear product quality indicators and calculation methods to ensure the accuracy and comparability of quality data. Secondly, establish a scientific data collection and processing process to ensure that the data collection process is accurate and complete, and ensure that the data transmission and processing process conforms to scientific statistical principles. For example, e-commerce platforms can establish an automated system for order data collection to ensure that the key information of each order is accurately recorded to avoid data loss or errors. Finally, establish a regular data quality review and verification mechanism. Businesses can regularly review and validate data to identify and correct errors and anomalies in the data. For example, logistics companies can regularly conduct sampling checks on cargo transportation data to ensure the accuracy and completeness of the data.

4.2. Strengthen the application of mathematical statistical methods and improve the quality of data statistics

In order to improve the quality of data statistics, enterprises can take the following effective measures to strengthen the application of mathematical statistical methods. Firstly, build a data analytics team. Businesses can set up a dedicated data analytics team, consisting of experienced analysts and statisticians, who are responsible for data collection, processing, and analysis. For example, a market research company can set up a dedicated data analysis team to provide customers with accurate market trend and competitor analysis reports based on in-depth analysis of market research data. Secondly, strengthen data quality management. Enterprises should establish a sound data quality management system, and strictly monitor and manage the source, collection, processing, storage and use of data to ensure the accuracy, integrity and reliability of data. At the same time, the verification and verification of data should also be strengthened to avoid misjudgment and misleading due to data errors. Finally, adopt advanced data analysis tools and techniques. With the continuous development of information technology, more and more data analysis tools and technologies (such as data mining, machine learning, artificial intelligence, etc.) are applied to enterprise economic analysis. Enterprises should actively adopt these advanced data analysis tools and technologies to improve the efficiency and accuracy of data analysis and provide more scientific and accurate support for enterprise decision-making [7].

4.3. Improve the ability of economic data statistics and informatization and the overall level of mathematics and statistics

In the economic analysis of enterprises, it is very important to improve the informatization ability of economic data statistics and improve the overall level of mathematical statistics. Firstly, enterprises can enrich employees' mathematical statistics knowledge and improve their mathematical statistics skills through active training, such as organizing internal training or hiring professional institutions to conduct training, so that employees can master the basic concepts of statistics, common statistical methods, and data analysis skills, and improve employees' understanding and application ability of mathematical statistics, so that they can skillfully use mathematical statistical methods for data analysis and interpretation. Secondly, companies can encourage employees to participate in

professional training and academic research. By participating in industry conferences, academic seminars, training courses, and other activities, employees can network with other professionals to gain the latest knowledge of mathematical and statistical theories and applications. Thirdly, businesses can provide employees with access to professional statistical software and tools. For example, enterprises purchase and install statistical software that adapts to the needs of the enterprise, such as Python, SPSS, etc., and provide training opportunities to make employees proficient in the use of these tools, so as to improve the efficiency and accuracy of data analysis. Finally, establishing partnerships with universities or research institutes is also an effective way to improve the ability of mathematics and statistics. In collaboration with specialized academic institutions, experts can be invited for guidance, joint research projects, and data and resources can be shared. Such cooperation helps enterprises to connect with the latest mathematical and statistical research results, broaden the academic horizons of employees, and promote the application and innovation of mathematical statistics in enterprise economic analysis. In short, through training and learning, participation in academic research, provision of professional tools, and cooperation with professional institutions, enterprises can help employees improve their mathematical statistical skills, thereby improving the ability of economic data statistical informatization, and thus improving the overall level of mathematical statistics [7,8].

5. Summary

The application of mathematical statistical methods in the economic analysis of enterprises has brought enterprises into a new era. By understanding the patterns and trends behind data, companies can make more informed decisions, achieve sustainable growth, and contribute to the sustainable development of the economy. This unique and cutting-edge approach has not only changed the way businesses operate, but has revolutionized the entire economy. With the continuous advancement of technology and the promotion of innovation, mathematical statistical methods will continue to play an irreplaceable role and can promote the healthy development of enterprises.

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