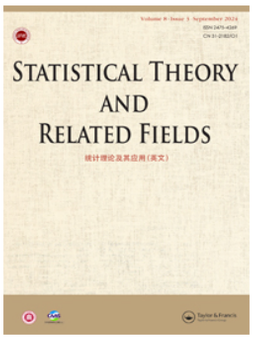

Statistical Theory and Related Fields

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tstf20

Lifelong dedication and ever-admirable stature – in commemoration of the first anniversary of Mr. Mao Shisong's passing

Jinglong Wang, Jixiang Zhou, Xiaolong Pu, Yincai Tang & Yan Li

To cite this article: Jinglong Wang, Jixiang Zhou, Xiaolong Pu, Yincai Tang & Yan Li (2024) Lifelong dedication and ever-admirable stature – in commemoration of the first anniversary of Mr. Mao Shisong's passing, Statistical Theory and Related Fields, 8:3, 243-250, DOI: 10.1080/24754269.2024.2382572

To link to this article: https://doi.org/10.1080/24754269.2024.2382572

STATISTICAL THEORY AND RELATED FIELDS
2024, VOL. 8, NO. 3, 243–250
https://doi.org/10.1080/24754269.2024.2382572

Taylor & Francis
Taylor & Francis Group

RAPID COMMUNICATION

Lifelong dedication and ever-admirable stature – in commemoration of the first anniversary of Mr. Mao Shisong's passing

Jinglong Wang, Jixiang Zhou, Xiaolong Pu, Yincai Tang and Yan Li

School of Statistics, East China Normal University, Shanghai, People's Republic of China

On January 16, 2023, at 14:01, our beloved and esteemed Mr. Mao Shisong passed away at the age of 87, leaving us with great sorrow. In the days following Mr. Mao's departure, our sorrow for his absence has become increasingly profound, and our remembrance of him is ever more vivid. As we publish this special commemorative issue in *Chinese Journal of Applied Probability and Statistics* for the first anniversary of Mr. Mao's death, we honor his life of ceaseless endeavor, his dedication to fairness and capability, and his pioneering spirit of innovation.

Mr. Mao Shisong was born on August 18, 1936, in the country of Chao nestled within Anhui province, China. In 1954, driven by a fervent passion for science, he successfully passed the National College Entrance Examination and was admitted to the department of mathematics at East China Normal University. In 1958, after graduation, Mr. Mao remained in the department of mathematics to work, and commenced his study of probability theory and mathematical statistics in response to the needs of the country. From 1978 to 1982, Mr. Mao served as the deputy head of the department of mathematics, and from 1986 to 1994, he became the head of the newly established department of mathematical statistics. He was promoted to associate professor in 1981 and professor in 1986, and was honored as a tenured professor by East China Normal University in 2002. Mr. Mao was appointed by the Ministry of Education as a member of the Mathematics Planning Group of the Ministry of Education for the Fifteen-Year (1986–2000) Science and Technology Development Plan (1983), as a member of the Expert Committee for the translation of outstanding modern foreign statistical works by the National Committee of Statistical Textbook Editorial Committee (1995), as an advisor to the fourth National Committee of Statistical Textbook Editorial Committee (2001), and as an academic supervisor of the postdoctoral research station of Shanghai Futures Exchange (2003), and as a lifelong researcher of Shanghai Academy of Quality Science (2005). Mr. Mao served as the third and sixth vice president of the Chinese Society for Probability and Statistics, vice president of the Shanghai Association for Quality (formerly known as the Shanghai Association for Quality Management) (1993–2008), and president of the Shanghai Society of Applied Statistics for Quality Technology (formerly known as the Shanghai Association for Applied Statistics) (1997–2009).

Mr. Mao Shisong dedicated his life to serving the country, displaying courage and commitment. From probability theory, mathematical statistics, industrial statistics to financial statistics, Mr. Mao Shisong served the country wherever he was needed. Mr. Mao Shisong went forward and pioneered the distinguished and unique path to the development and promotion of statistics, and has been well recognized by the public. China Association for Quality awarded Mr. Mao as 'National Outstanding Quality Management Worker' (1993); Shanghai Municipal Economic Committee, Shanghai Municipal Bureau of Technical Supervision and Shanghai Association for Quality Management jointly awarded Mr. Mao as 'Shanghai Outstanding Quality Management Promoter' (1999); the State Bureau of Quality and Technical Supervision awarded Mr. Mao the title of 'Outstanding Contributor to National Quality Management' (2002); China Association for Quality and All-China Federation of Trade Unions awarded Mr. Mao as 'China Outstanding Quality Model' in the first 'China's Outstanding Quality Person' election (2005); Shanghai Association for Quality awarded Mr. Mao with the title of 'Shanghai Magnolia Quality Contribution Award' (2007); Shanghai Association for Quality awarded Mr. Mao the title of 'Shanghai Quality Management Meritorious Person' (2012).

Mr. Mao Shisong is a rigorous scholar, setting a standard for future generations. He has made outstanding contributions in both theoretical and applied statistics. Mr. Mao has published more than 110 academic papers, over 50 popular science papers, over 40 monographs and textbooks, and 1 book on popular science. Mr. Mao focused

CONTACT Yincai Tang yctang@stat.ecnu.edu.cn School of Statistics, East China Normal University, Shanghai 200062, People's Republic of China
The paper was first published in Chinese Journal of Applied Probability and Statistics, Vol. 40, No. 2, pp. 183–193.

on practical applications, constantly seeking innovation and being pragmatic, and rooted his research in China, aspiring to be a pioneer in the field. As early as during his study in Moscow University of the Soviet Union, Mr. Mao published his first article in Russian (Mao, 1965), which solved the problem of symmetric memoryless channel transmission in communication. Afterwards, driven by the needs of social and economic development, Mr. Mao began to shift his focus to reliability statistics, experimental design, Bayesian statistics, and financial statistics. In the following, we briefly introduce Mr. Mao's achievements in the four areas of reliability statistics, experimental design, Bayesian statistics and financial statistics. Due to the limitations of our observations, this overview may not fully capture the breadth of his contributions.

The first area is reliability statistics. In the spring of 1965, Mr. Mao led students to the Luoyang Bearing Research Institute, where they studied the mechanism of random defects and the estimation method of life distribution of bearings based on actual bearing life data. Based on this, Mr. Mao published his first paper in Chinese (Mao et al., 1978), which investigated the estimation of product reliability characteristics when the product life follows a two-parameter Weibull distribution. Since then, Mr. Mao expanded his research and promotion of reliability methods. Together with several colleagues in the teaching and research section, he participated in the formulation of product reliability standards led by the Fourth Ministry of Machinery Industry (later known renamed as the Ministry of Electronics Industry). They collaborated to complete the *Standards for Life Testing and Accelerated Life Testing Data Processing Methods*, which was the basis of the National Standard GB/T 2689-1981. The achievement won the first prize of the Science and Technology achievements of the Fourth Ministry of Machinery Industry and the second prize of the major technological improvement achievements of the National Defense Science and Industry Commission.

Mr. Mao focused on the analysis method of accelerated life testing data, taking into account the practical needs of factories and research institutes. Two of the most common types of accelerated life testing methods used in industry field are step-up-stress accelerated life testing and constant-stress accelerated life testing. In the case of stepup-stress accelerated life testing arena, Mao (1985) proposed an acceleration model and an estimation method of Mean Time to Failure for the exponential distribution; Mao (1989) proposed an optimal design scheme for simple step-up-stress accelerated life testing and estimation methods such as confidence limits for reliability characteristics based on asymptotic variance minimization; Mao and Wang (1991) proposed a double-crossed step-up-stress accelerated life testing model and a data analysis method. These three investigations have attracted domestic attention and citations, and brought the development of related research in China. In the case of constant-stress accelerated life testing arena, Wang et al. (1989) proposed non-parametric estimation methods for various reliability characteristics; Mao and Han (1991) discussed the approximate unbiased estimation of the coefficients of the acceleration equation and various reliability characteristic estimation methods for Type I censoring and Weibull distribution tests; Mao and Zhang (1996) discussed the comparison of the advantages and drawbacks of several linear unbiased estimates; Zhang and Mao (1997) investigated improved methods for simple linear estimation. To address the accelerated life test with competing failures, Zhang and Mao (1994, 1995, 1998) proposed a series of estimation methods for reliability characteristics, providing suggestions for practical workers on how to effectively utilize competing risk failure mechanisms in different scenarios.

In collaboration with factories and research institutes, Mr. Mao realized the necessity of conducting product reliability analysis based on test scenarios with no failure data. Together with his collaborators, they proposed solutions using both classical methods and Bayesian methods, which were effectively applied to the reliability analysis of aerospace engines and bearings (Mao & Luo, 1989; Mao & Xia, 1992; Wang & Mao, 1992; Mao et al. 1993; 1996aa). In addition, Mr. Mao realized that acceptance schemes under no-failure conditions required specialized design, and a series of research achievements were developed under his guidance and participation. Wang et al. (1995) proposed an acceptance program for the no-failure case of constant-stress accelerated life testing of electric motors; in the case of lognormal distribution, He and Mao (2000) proposed a Bayesian implementation for verification tests, which drew attention and citations from both industry and academia, promoting in-depth research in this area. Subsequently, Mao and Chen (1996), based on actual bearing life tests, proposed a statistical analysis method for scenarios with only one failure data point. They used the multilayer Bayesian method, combined with the least squares method, to obtain the estimation of reliability characteristics under the Weibull distribution. Pang et al. (2001) used the Monte Carlo EM method to estimate the reliability characteristics in the case of only one failure data, avoiding the impact caused by the choice of prior distribution in the multilayer Bayesian method.

The second area is experimental design. Since 1972, Mr. Mao and his colleagues in the teaching and research section had been learning and actively promoting the application of orthogonal experimental design method in factories. In 1975, the book *Orthogonal Experimental Design Method*, co-authored by Mr. Mao, was officially published. With the vigorous promotion by Mr. Mao and others, experimental design began to be widely applied in domestic industries. At that time, practitioners in the field often used the main effects analysis method advocated

by Japanese scholar Genichi Taguchi. This method was simple and practical, and the optimal factor level combinations obtained were generally suitable when the interactions between factors were not significant. However, Mao et al. (1990) found that the main effects analysis method is not efficient and accurate enough when there are significant interactions among factors, so they proposed the sequential elimination level method. This method abandoned the traditional experimental design concept based on the 'average' point of view and ideas and focused on progressively eliminating inferior levels of each factor, so that the test range is quickly concentrated near the optimal level, achieving the effect of reducing the sample size and the number of repeated experiments. In addition, by adding the interval iterative search, adaptive adjustment of the experiment level can be realized, and a general optimization method is formed.

In the parameter design, Genichi Taguchi proposed to use Signal-to-Noise Ratio as an internal index. However, this method is effective only when the variance of the quality characteristic is proportional to the square of its mean, and the proportionality factor does not depend on the adjustment factors, which poses a significant limitation. To address this problem, Mr. Mao and his collaborators proposed several solutions. Hou et al. (1994) proposed to use the mean absolute deviation as the internal index, and decompose this index into two adjustment indexes: positive deviation and negative deviation, in order to find out the direction of reducing the mean absolute deviation, and then quickly find the optimal level combination. Case studies showed that this method is simple and effective, often leading to efficient adjustments of controllable factors, thereby reducing the number of experiments to varying degrees and improving analysis efficiency. Chen et al. (1996), based on the characteristics of parameter design, proposed a variance estimation method from the perspective of conditional distribution and provided corresponding variance estimation methods for calculable items. Case studies demonstrated that this method is superior toGenichi Taguchi's 'direct product method.' Dai et al. (1998) proposed an unbiased design, as well as a design with additional centroids and a biased design to obtain more accurate variance estimates.

The third area is Bayesian statistics. Mr. Mao is one of the pioneers in investigating and applying Bayesian methods in China. In the 1980s, to address the problem of long life test period and high costs associated with color televisions, considering the extensive historical test data accumulated by enterprises, Mr. Mao proposed the use of Bayesian methods. The prior distribution in these methods was formed from the aggregated historical information. Based on this, the *Bayesian Method for Life Testing of Color Receivers* was developed, which became the foundation for the National Standard GB/T 9382-1988 and won the First Prize of the National Science and Technology Award from the Ministry of Electronics Industry. Subsequently, Singpurwalla and Mao (1988), as well as Han et al. (1990), proposed methods for forming prior distributions by extracting, expressing, and adjusting expert opinions, thereby providing Bayesian analysis methods for reliability characteristics and developing Bayesian verification test schemes. In fact, Mr. Mao has applied and developed Bayesian analysis methods to meet the practical needs of reliability analysis, which has been covered in the section of 'Reliability Statistics' above and will not be elaborated further here.

Furthermore, to address the computational difficulties in Bayesian analysis, Mr. Mao proposed several approximate solutions. Mao and Tang (1993) gave a simple and fast algorithm to obtain the Bayesian approximation interval estimation by deriving the approximation expression of the integrals, along with the accuracy of their approximation. To overcome the challenges posed by the complex likelihood function of grouped data, which makes it difficult to use Bayesian methods for life characteristic inference, Liu and Mao (1997) proposed using the Gibbs sampling method and a hybrid of Gibbs sampling and Metropolis algorithm, and obtained higher accuracy of the inferred life characteristics values. For various regression models, Lu and Mao (2004, 2005a, 2005b, 2005c, 2006) proposed a Bayesian spline estimation method for model coefficients. For example, Lu and Mao (2006) proposed to approximate the coefficients of the generalized variable coefficient model with Bayesian B-spline function. They employed a uniform Uninformative prior for the number of modes and used Bayesian model averaging to estimate the function coefficients, achieving excellent estimation results.

The fourth area is financial statistics. In December 1990, the Shanghai Stock Exchange, the first stock exchange in Chinese mainland since the foundation of the People's Republic of China, was officially established. For the emerging stock market, there is an urgent need to establish a statistical index system that could reflect the overall characteristics of the market, to find out the factors affecting the stock market, and to measure the impact of policies on the market. At nearly 60 years old, Mr. Mao resolutely ventured into this new field of research. In collaboration with the Shanghai Stock Exchange and other institutions, he led his students and colleagues in conducting systematic research on the economic functions and statistical measurements of China's stock market, completing two projects and publishing several related papers. For example, Mao et al. (1996ba) conducted a comprehensive analysis of the impact of policies, market expansion, news and other information on the volatility of the Shanghai stock market; He and Mao (1997) discussed a multifactor model influencing emerging stock markets and compared the models of stock markets in different countries. The above research results were summarized into the *Statistical Measurement Study on the Economic Functions of China's Stock Market at the Present Stage (General Report)*, which

was published in a full-page article on March 20, 1996 in the 12th edition of the *Shanghai Securities News* (Mao et al., 1996bb), and had a notable impact on both the industry and the academia. In 1997, Mr. Mao participated in the major project of National Natural Science Foundation of China *Financial Mathematics, Financial Engineering and Financial Management*, chaired by Academician Peng Shige, and gave a mixture model of bivariate lognormal distribution for the market value of stock holdings, which effectively explains the current state of the stock market better and has practical significance for market regulation. Mao and He (1998) proposed the application of ARIMA model to characterize the regularity of the Shanghai Stock Exchange Index, which was published in *The First International Conference on Intelligent Data Engineering and Learning*, receiving praise from international peers. Aiming at the technical difficulties in the financial field, Mr. Mao Shisong has carried out a series of research in the fields of portfolio theory, option pricing, risk management and so on, in extensive collaborations with the Shanghai Stock Exchange, the Shanghai Futures Exchange, the relevant securities companies and fund companies. He and Mao (2000) developed a capital asset pricing model that describes the real market under different assumptions, proposed methods for estimating model parameters, and applied these models to several stocks in the Shanghai stock market to construct optimal investment portfolios. Gu and Mao (2000) presented the simultaneous nonparametric estimation of the mean and covariance functions of a process under the assumption that securities prices or returns follow a time-homogeneous It$^{\circ}$ process, and based on this, nonparametric estimation of the Beta coefficient was obtained. Xiao and Mao (2002) proposed a comprehensive valuation model for currency options and methods for estimating its parameters. Liu and Mao (2003) studied the non-parametric estimation of conditional variance functions in time series models, using the M-plot method to determine bandwidth for kernel estimation and local polynomial estimation, and provided risk-neutral adjustment methods for derivative securities pricing in time series models. Wang and Mao (2004) proposed a new value at risk based on the Bayesian method for predicting future returns, and discussed its properties and characteristics.

In addition to the above four areas, Mr. Mao Shisong has also conducted research and promotion in the areas such as sampling test and statistical process control. For example, in destructive testing and high-cost testing, reducing the sample size is a crucial issue. To address the shortcomings of the Sequential Probability Ratio Test (SPRT), which cannot control the sample size, Pu et al. (2006a, 2006b, 2007), under the guidance and participation of Mr. Mao, proposed the two-step sequential mesh test. Compared to the truncated SPRT method recommended by the internationally recognized sampling standard IEC1123, this method reduces the average sample size by over 30%, significantly lowering product inspection costs. This related work was awarded the provincial and ministerial level First Prize for Science and Technology Progress Award in 2006.

Mr. Mao Shisong emphasized extensive communication and cooperation with various sectors. He made several academic visits to institutions abroad, including Moscow State University in the former Soviet Union, the University of Maryland, the University of Wisconsin–Madison, and the George Washington University in the USA, the University of Waterloo and the University of Ottawa in Canada, as well as the Hong Kong Polytechnic University. To enhance exchanges among various sectors, Mr. Mao Shisong and Mr. Wei Zongshu, among others, proposed the establishment of an academic journal in the field of mathematical statistics in the *Report on the Establishment of a 'Mathematical Statistics' Major in Our University's Department of Mathematics*, submitted to the Ministry of Education in 1980. In 1982, the first annual conference of the Chinese Society for Probability and Statistics was held, during which it was decided to establish the journal *Chinese Journal of Applied Probability and Statistics*. The journal was to be sponsored by the Chinese Society for Probability and Statistics, with East China Normal University being responsible for setting up the editorial office. The first issue of *Chinese Journal of Applied Probability and Statistics* was officially published in 1985. Mr. Mao served as the associate Editor-in-Chief of this journal from 1985 to 1988 and from 1992 to 1996. This journal remains an important platform for academic exchange in the field of statistics in China.

Mr. Mao Shisong actively promoted deep-level exchanges with the industry. From 1988 to 1993, Mr. Mao and his colleagues conducted the 'Seminar on Statistical Applications' with the factory engineers every three weeks on Sundays at Mr. Wei Zongshu's home, which focused on practical problems encountered by factory personnel, such as determining sample sizes, and also introduced emerging statistical methods. This seminar built a bridge between engineers and teachers, facilitating communication and promoting the application of statistics. Mr. Mao and his collaborators solved numerous practical problems, including specialized studies on the analysis of life test data for products like low-voltage motors, rolling bearings, and sensors (e.g., Wang et al., 1979, 1980; Yang et al., 1990; Shi & Mao, 1993; Mao et al., 1993; Diao et al., 1995). Mr. Mao once said, 'Mathematical statistics should not be developed behind closed doors, but only when it is truly applied to the field of production and practice can its value be reflected, so that mathematical statistics can really take root in China.' Meanwhile, Mr. Mao has published a series of popular science articles on mathematical statistics, reliability statistics and statistical process control in *Quality and Reliability*, *Shanghai Quality*, *Mathematics Teaching*, *Mathematical Bulletin*, etc., which have further strengthened the communication and promotion.

As a pioneer and leading figure in the education of mathematical statistics in China, Mr. Mao Shisong had a farsighted vision. His recommendations on the training of mathematical statistics talents were adopted by the Ministry of Education. Mr. Mao was an innovator and a pioneer, founding the undergraduate program in mathematical statistics at East China Normal University in 1983, one of the first three such programs in China, and establishing the first Department of Mathematical Statistics in China in 1984. Under Mr. Mao's leadership, the Department of Probability Theory and Mathematical Statistics at East China Normal University was designated as a key discipline of higher education by the Ministry of Education in 1987. Facing the shortage of mathematical statistics teachers and the urgent need of statistical talents in the industry, Mr. Mao has led the teachers to actively carry out various kinds of personnel training, organizing assistant teacher training courses, summer training courses for teachers of normal colleges and universities, special training courses for mathematical statistics workers and graduate courses for modern statistical quality management for the working staff, etc. Mr. Mao dedicated himself to nurturing talents, supervising 20 doctoral students and 55 master's students throughout his career. He was honored with the Shanghai Yucai Award in 1997 and the Baosteel Excellent Teacher Award in 2001.

In the 1980s, under the commission of the Ministry of Education, Mr. Mao Shisong led the organization of domestic experts to write and publish the first systematic set of mathematical statistics textbooks. In 1994, after Mr. Mao resigned from the dean of the Department, he devoted himself even more to the preparation of textbooks and translations. The textbooks edited by Mr. Mao are widely referred to as the 'Mao Book' by readers, which are the most numerous and influential in the field of mathematical statistics in China. The textbook *Probability Theory and Mathematical Statistics Tutorial*, co-authored by Mao Shisong, Cheng Yiming, and Pu Xiaolong, was published in 2004 and is one of the most influential undergraduate textbooks in China. It was selected as a national-level planned textbook and a national excellent textbook, with its first edition winning the First Prize for Excellent Textbooks of Shanghai Higher Education in 2007, and the third edition winning the first prize of the first National Textbook Construction Award in 2021, the highest honor in the field of textbooks in China. The graduate textbook *Advanced Mathematical Statistics*, co-authored by Mao Shisong, Wang Jinglong, and Pu Xiaolong, is one of the most influential graduate-level textbooks in China. It is recommended by the Ministry of Education for graduate teaching and was recommended as a classic work in statistics by the Ministry of Education's Statistics Discipline Review Group, winning the Second Prize for Excellent Teaching Achievements in Shanghai in 2001. The textbook *Probability Theory and Mathematical Statistics*, co-edited by Mao Shisong and Zhou Jixiang, was awarded the Excellent Statistical Textbook Prize by the National Bureau of Statistics in 2001 and the First Prize of Excellent Textbook by the Ministry of Education in 2002. The textbook *Mathematical Statistics*, co-authored by Mao Shisong and Wang Jinglong, won the Excellent Textbook Award by the National Bureau of Statistics in 1995 and the Excellent Shanghai Textbook Award in 2001. *Bayesian Statistics* written by Shisong Mao and *Statistical Methods for Quality Management*, co-edited by Jixiang Zhou and Shisong Mao, were both awarded the Excellent Statistical Textbook Prize by the National Bureau of Statistics in 2001. The case study 'Probability Distribution of Stockholder's Stock Value', authored by Mao Shisong, Liu Zhong, and Pi Liuyi, was included in the *Statistics Case Study Textbook*, which won the Third Prize of the Fifth National Outstanding Achievements in Statistical Research.

In 2001, China established the professional qualification examination system for quality technical personnel. At the age of 65, Mr. Mao has once again become actively engaged, wholeheartedly participating in the compilation and review of relevant textbooks. He contributed to the publication of the *National Quality Technical Personnel Professional Qualification Examination Books* (divided into primary and intermediate levels) and *Six Sigma Core Curriculum: Black Belt Reader*, and participated in the translation of the *Certified Reliability Engineer Handbook*. To address the needs of engineers in learning probability theory and mathematical statistics, and in line with the idea of intensive application, Shisong Mao and Jixiang Zhou co-edited *Engineering Statistics*, published in 2018, when Mr. Mao was 82 years old.

The iron tower stands firm, and our longing for him will never end; the river flows endlessly, and our love for him never ceases; though he has departed, his spirit will live on eternally. Mr. Mao Shisong devoted his life to education with integrity and sincerity. He always regarded the development of the nation and the advancement of society as his mission, dedicating himself to the progress of statistics. His spirit will forever inspire us to forge ahead and never give up. Only by inheriting his spirit, actively contributing to national development, and striving to promote the progress of our people and society, can we truly honor his legacy!

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Yincai Tang http://orcid.org/0000-0001-6756-6461

Mr. Mao Shisong's Bibliography and Representative Papers

I. Monographs and Textbooks

Mathematics Application Group of Shanghai Normal University Mathematics Department. (1975). *Introduction to probability*. Shanghai Educational Publishing House. (in Chinese).

Mao, S. S., Ding, Y., Zhou, J. X., & Lv, N. G. (1981). *Regression analysis and experimental design* (2nd ed.). East China Normal University Press. (in Chinese).

Mao, S. S., & Wang, L. L. (1984). *Reliability statistics*. East China Normal University Press. (in Chinese).

Mao, S. S., & Wang, J. L. (1990). *Mathematical statistics*. East China Normal University Press. (in Chinese).

Shanghai Quality Management Association. (1997). *Statistical techniques in quality systems*. Shanghai Scientific & Technological Publishers. (in Chinese).

Zhang, X. Y., & Mao, S. S. (1996). *Methods of business decision making*. East China Normal University Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (1996). *Probability theory and mathematical statistics*. China Statistics Press. (in Chinese).

Wang, W. Z., & Mao, S. S. (1997). *Design and analysis of experiments*. East China Normal University Press. (in Chinese).

Mao, S. S., & Wang, L. L. (1997). *Accelerated life testing*. Science Press. (in Chinese).

Liu, B. (1997). *Empirical analysis of China's securities market*. Academia Press. (in Chinese).

Mao, S. S., Pu, X. L., & Liu, Z. (Translators). (1998a). *Statistical models and analysis of lifetime data*. China Statistics Press. (in Chinese).

Mao, S. S., Wang, J. L., & Pu, X. L. (1998b). *Advanced mathematical statistics*. Higher Education Press. (in Chinese).

Mao, S. S. (1999). *Bayesian statistics*. China Statistics Press. (in Chinese).

Zhou, J. X., & Mao, S. S. (1999). *Quality management statistical methods*. China Statistics Press. (in Chinese).

Wang, Q. S., & Lu, X. P. (1999). *Quality management statistical methods*. Dongbei University of Finance & Economics Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (2000). *Probability theory and mathematical statistics* (2nd ed.). China Statistics Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (2000). *Probability theory and mathematical statistics: Exercises and answers* (2nd ed.). China Statistics Press. (in Chinese).

National Office for the Qualification Examination of Quality Professionals. (2001). *National quality professional qualification examination books (primary and intermediate levels)*. China Personnel Press. (in Chinese).

Mao, S. S. (2002). *Fundamentals of statistics*. East China Normal University Press. (in Chinese).

Tang, X. F. (2002). *Six sigma core curriculum: Black belt reader*. Standards Press of China. (in Chinese).

Mao, S. S. (2003). *Handbook of statistics*. Science Press. (in Chinese).

Mao, S. S., Zhou, J. X., & Chen, Y. (2004aa). *Experimental design*. China Statistics Press. (in Chinese).

Mao, S. S., Cheng, Y. M., & Pu, X. L. (2004ba). *Probability theory and mathematical statistics tutorial*. Higher Education Press. (in Chinese).

Mao, S. S., Cheng, Y. M., & Pu, X. L. (2004bb). *Probability theory and mathematical statistics tutorial: Exercises and answers*. Higher Education Press. (in Chinese).

Mao, S. S., Zhou, J. X., & Chen, Y. (2005). *Experimental design: Study guide and exercises*. China Statistics Press. (in Chinese).

Tang, X. F. (2006). *Six sigma core curriculum: Black belt reader* (Revised Edition). Standards Press of China. (in Chinese).

Mao, S. S., Wang, J. L., & Pu, X. L. (2006). *Advanced mathematical statistics* (2nd ed.). Higher Education Press. (in Chinese).

Zhou, J. X., & Mao, S. S. (2008). *Quality management statistical methods* (2nd ed.). China Statistics Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (2008). *Probability theory and mathematical statistics* (3rd ed). China Statistics Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (2008). *Probability theory and mathematical statistics: Exercises and answers* (3rd ed). China Statistics Press. (in Chinese).

Mao, S. S., Tang, Y. C., & Wang, L. L. (2008). *Reliability statistics*. Higher Education Press. (in Chinese).

Mao, S. S., & He, S. H. (2010). *Probability theory and statistics (economics and management)*. Wuhan University Press. (in Chinese).

Mao, S. S., Cheng, Y. M., & Pu, X. L. (2011). *Probability theory and mathematical statistics tutorial* (2nd ed.). Higher Education Press. (in Chinese).

Mao, S. S., & Lu, X. L. (2011). *Mathematical statistics*. China Renmin University Press. (in Chinese).

Mao, S. S., Zhou, J. X., & Chen, Y. (2012aa). *Experimental design* (2nd ed.). China Statistics Press. (in Chinese).

Mao, S. S., & Tang, Y. C. (2010). *Bayesian Statistics* (2nd ed.). China Statistics Press. (in Chinese).

Mao, S. S., Pu, X. L., & Cheng, Y. M. (2012ba). *A concise course in probability theory and mathematical statistics*. Higher Education Press. (in Chinese).

Mao, S. S., Cheng, Y. M., & Pu, X. L. (2012bb). *Probability theory and mathematical statistics tutorial: Exercises and answers* (2nd ed.). Higher Education Press. (in Chinese).

Zhuang, D. C., & Mao, S. S. (2010). *Degradation data statistical analysis*. China Statistics Press. (in Chinese).

Shanghai Association for Quality, & Shanghai Academy of Quality Management (Translators). (2015). *Certified reliability engineer handbook* (2nd ed.). Standards Press of China. (in Chinese).

Mao, S. S., & Lu, X. L. (2016). *Mathematical statistics* (2nd ed.). China Renmin University Press. (in Chinese).

Mao, S. S., & Zhou, J. X. (2018). *Engineering statistics*. Higher Education Press. (in Chinese).

Mao, S. S., Cheng, Y. M., & Pu, X. L. (2019). *Probability theory and mathematical statistics tutorial* (2nd ed.). Higher Education Press. (in Chinese).

Mao, S. S., Zhou, J. X., Zhou, Y. C., & Wang, Y. P. (2020aaa). *Experimental design* (3rd ed.). China Statistics Press. (in Chinese).

Mao, S. S., Zhou, J. X., & Zhang, R. Q. (2020baa). *Probability theory and mathematical statistics* (4th ed.). China Statistics Press. (in Chinese).

Mao, S. S., Zhou, J. X., & Zhang, R. Q. (2020bba). *Probability theory and mathematical statistics: Exercises and answers* (4th ed.). China Statistics Press. (in Chinese).
Mao, S. S., Cheng, Y. M., & Pu, X. L. (2020bbb). *Probability theory and mathematical statistics tutorial: Exercises and answers* (3rd ed.). Higher Education Press. (in Chinese).
Mao, S. S., Wang, J. L., & Pu, X. L. (2021). *Advanced mathematical statistics* (3rd ed.). Higher Education Press. (in Chinese).

II. Popular Science Works

Mao, S. S., & Wei, Z. J. (2000). *Exploring the mysteries of the random world—An introduction to probability and statistics (high school reading)*. Shanghai Educational Publishing House. (in Chinese).

III. Selected Academic Papers

1. Early Papers

Mao, S. S. (1965). Asymptotic estimation of error probability in symmetric memoryless channel information transmission. *Probability Theory and Its Applications*, *1965*(1), 167–175. (in Russian).
Mao, S. S., Fei, H. L., & Ding, Y. (1978). Parameter estimation of extreme value distributions using two order statistics. *Journal of Shanghai Normal University (Natural Sciences)*, *1978*(1), 1–17. (in Chinese).

2. Reliability Statistics

Mao, S. S. (1985). Statistical analysis of accelerated life testing-step-stress models under the exponential distribution case. *Acta Mathematicae Applicatae Sinica*, *8*(3), 311–316. (in Chinese).
Mao, S. S. (1989). Optimal design and statistical analysis of simple step-up-stress accelerated life testing. *Chinese Journal of Applied Probability and Statistics*, *5*(2), 173–179. (in Chinese).
Mao, S. S., & Wang, L. L. (1991). Statistical analysis of step-up-stress accelerated life testing under crossed exponential distribution. *Chinese Journal of Applied Probability and Statistics*, *7*(4), 406–414. (in Chinese).
Wang, L. L., Rue, R. X., & Mao, S. S. (1989). Nonparametric statistical analysis method for accelerated life testing. *Mathematical Theory and Applied Probability*, *4*(4), 478–488. (in Chinese).
Mao, S. S., & Han, Q. (1991). Statistical distribution of accelerated life testing with censored samples under Weibull distribution. *Chinese Journal of Applied Probability and Statistics*, *7*(1), 61–72. (in Chinese).
Mao, S. S., & Zhang, Z. H. (1996). Several linear unbiased estimates and their comparison in constant-stress testing. *Chinese Journal of Applied Probability and Statistics*, *12*(3), 301–311. (in Chinese).
Zhang, Z. H., & Mao, S. S. (1997). Improvements on simple linear estimation in constant-stress life testing. *Applied Mathematics: A Journal of Chinese Universities (Series A)*, *12*(4), 417–424. (in Chinese).
Zhang, Z. H., & Mao, S. S. (1994). Statistical analysis of simple step-up-stress accelerated life testing for products with competing failure mechanisms. *Applied Mathematics: A Journal of Chinese Universities (Series A)*, *9*(4), 421–428. (in Chinese).
Zhang, Z. H., & Mao, S. S. (1995). Statistical analysis of constant-stress life testing for products with competing failure mechanisms under exponential distribution. *Chinese Journal of Applied Probability and Statistics*, *11*(3), 289–296. (in Chinese).
Zhang, Z. H., & Mao, S. S. (1998). Bayesian estimation in step-up-stress accelerated life testing for products with competing failure mechanisms under exponential distribution. *Chinese Journal of Applied Probability and Statistics*, *14*(1), 91–98. (in Chinese).
Mao, S. S., & Luo, C. B. (1989). Reliability analysis of zero-failure data. *Mathematical Theory and Applied Probability*, *4*(4), 489–506. (in Chinese).
Mao, S. S., & Xia, J. F. (1992). The hierarchical Bayesian analysis of the zerofailure data. *Applied Mathematics: A Journal of Chinese Universities (Series A)*, *7*(3), 411–421.
Wang, J. L., & Mao, S. S. (1992). Lower confidence limit for MLR distribution with zero-failure data. *Journal of East China Normal University (Natural Sciences)*, *1992*(4), 32–37. (in Chinese).
Mao, S. S., Li, Y. M., Lu, S. L., & Ge, Y. B. (1993). Treatment of constant-stress accelerated life testing with zero-failure data. *Chinese Journal of Applied Probability and Statistics*, *9*(2), 216–218. (in Chinese).
Mao, S. S., Wang, L. L., & Pu, X. L. (1996aa). Reliability analysis of Weibull distribution with zero-failure data. *Chinese Journal of Applied Probability and Statistics*, *12*(1), 95–107. (in Chinese).
Wang, L. L., Mao, S. S., Wang, J., Yang, S. T., & Xu, J. (1995). Zero-failure acceptance scheme for electric motor mean life. *Chinese Journal of Applied Probability and Statistics*, *11*(4), 439–442. (in Chinese).
He, J. B., & Mao, S. S. (2000). Lognormal Bayesian validation test scheme with zero-failure data. *Chinese Journal of Applied Probability and Statistics*, *16*(3), 239–248. (in Chinese).
Mao, S. S., & Chen, J. (1996). Bayesian analysis of data with only one failure. *Applied Mathematics: A Journal of Chinese Universities (Series B)*, *11*(4), 435–444. https://doi.org/10.1007/BF02662883
Pang, W. K., Pang, W. K., Pang, W. K., & Mao, S. S. (2001). Parameter estimate with only one complete failure observation using Monte Carlo EM algorithm. *International Journal of Reliability, Quality and Safety Engineering*, *8*(2), 109–122. https://doi.org/10.1142/S0218539301000402

3. Experimental Design

Mao, S. S., Ma, F. S., & Wu, J. (1990). Sequential elimination level method–A search method using orthogonal tables. *Chinese Journal of Applied Probability and Statistics*, *6*(2), 185–203. (in Chinese).
Hou, X. L., Mao, S. S., & Zhou, J. X. (1994). Absolute deviation method in parameter design. *Chinese Journal of Applied Probability and Statistics*, *10*(3), 278–289. (in Chinese).

Chen, Y., Zhou, J. X., & Mao, S. S. (1996). Variance estimation in parameter design. *Chinese Journal of Applied Probability and Statistics*, *12*(2), 201–209. (in Chinese).
Dai, P. S., Zhou, J. X., & Mao, S. S. (1998). Design of noise factor level. *Chinese Journal of Applied Probability and Statistics*, *14*(4), 366–370. (in Chinese).

4. Bayesian Statistics

Singpurwalla, N. D., & Mao, S. S. (1988). Reliability analysis using Weibull lifetime data and expert opinion. *IEEE Transactions on Reliability*, *37*(3), 340–347. https://doi.org/10.1109/24.3765
Han, Q., Wang, L. L., & Mao, S. S. (1990). Utilizing expert opinions to determine prior distributions to design Bayesian validation test schemes. *Mathematical Theory and Applied Probability*, *5*(4), 422–430. (in Chinese).
Mao, S. S., & Tang, D. J. (1993). An accurate approximation for Bayesian interval estimation. *Acta Mathematicae Applicatae Sinica*, *16*(2), 158–170. (in Chinese).
Liu, Z., & Mao, S. S. (1997). Bayesian analysis of grouped data–Gibbs sampling method. *Chinese Journal of Applied Probability and Statistics*, *13*(2), 211–216. (in Chinese).
Lu, Y. Q., & Mao, S. S. (2004). Bayesian spline nonparametric regression. *Journal of East China Normal University (Natural Sciences)*, *2004*(4), 33–39+90. (in Chinese).
Lu, Y. Q., & Mao, S. S. (2005). Bayesian estimation in a semiparametric partially linear errors-in-variable model. *Journal of East China Normal University (Natural Sciences)*, *2005*(3), 31–36. (in Chinese).
Lu, Y. Q., & Mao, S. S. (2005). Bayesian spline estimation of varying coefficient models. *Chinese Journal of Applied Probability and Statistics*, *21*(1), 9–20. (in Chinese).
Lu, Y. Q., & Mao, S. S. (2005). B-spline Bayesian estimation of the generalized nonparameter models. *Mathematica Applicata*, *18*(1), 8–13. (in Chinese).
Lu, Y. Q., & Mao, S. S. (2006). Bayesian B-spline estmation of the generalized varying-coefficient models. *Journal of System Science and Mathematical Science*, *26*(2), 169–177. (in Chinese).

5. Financial Statistics

Mao, S. S., Cheng, Y. M., Zhou, B., He, J. B., & Zhang, P. Y. (1996ba). The impact of policies, expansion, and information on the Shanghai Stock Market. *Shanghai Securities News*, 1996-3-31. (in Chinese).
He, J. B., & Mao, S. S. (1997). Multi-factor model impacting emerging stock markets and comparison with Chinese stock markets. *Journal of Statistics and Information*, *12*(3), 35–42. (in Chinese).
Mao, S. S., Xu, G. X., & Xue, J. (1996bb). Statistical measurement of the economic functions of China's current securities market (General Report). *Shanghai Securities News*, 1996-3-20. (in Chinese).
Mao, S. S., & He, J. B. (1998). Fractional ARIMA(*p, d, q*) model and its application in Shangzheng index. Hongkong: *The First International Symposium, Intelligent Data Engineering and Learning*.
He, J. B., & Mao, S. S. (2000). Optimal investment portfolio construction and comparison based on several CAPM models. *Chinese Journal of Applied Probability and Statistics*, *16*(4), 398–408. (in Chinese).
Gu, J., & Mao, S. S. (2000). Non-parametric estimation of systematic risk beta coefficient. *Chinese Journal of Applied Probability and Statistics*, *16*(2), 191–198. (in Chinese).
Xiao, Q. X., & Mao, S. S. (2002). Exchange rate model and option valuation. *Chinese Journal of Applied Probability and Statistics*, *18*(1), 67–70. (in Chinese).
Liu, Z., & Mao, S. S. (2003). Non-parametric estimation of risk neutral processes. *Chinese Journal of Applied Probability and Statistics*, *19*(4), 337–346. (in Chinese).
Wang, N. S., & Mao, S. S. (2004). Bayesian value at risk. *Journal of Quantitative Economics and Technological Economics*, *21*(3), 91–99. (in Chinese).

6. Others

Pu, X. L., Yan, Z. G., Mao, S. S., Zhang, Y. S., & Li, Y. (2006a). The sequential mesh test for a proportion. *Journal of East China Normal University (Natural Sciences)*, *2006*(1), 63–71. (in Chinese).
Pu, X. L., Yan, Z. G., Mao, S. S., Li, Y., & Zhang, Y. S. (2006b). Sequential mesh test under Rayleigh distribution. *Journal of East China Normal University (Natural Sciences)*, *2006*(5), 87–92. (in Chinese).
Pu, X. L., Yan, Z. G., Mao, S. S., Zhang, Y. S., & Li, Y. (2007). The two-step sequential mesh test for a proportion. *Chinese Journal of Applied Probability and Statistics*, *23*(1), 77–83. (in Chinese).
Wang, J. Y., Mao, S. S., & Zhou, J. X. (1979). Censoring test of rolling bearing fatigue life and estimation methods for life distribution parameters. *Bearing*, *1979*(6), 15–25 + 57. (in Chinese).
Wang, J. Y., Mao, S. S., & Zhou, J. X. (1980). Censoring test of rolling bearing fatigue life and estimation methods for life distribution parameters. *Bearing*, *1980*(1), 14–24. (in Chinese).
Yang, S. T., Yan, H. M., Mao, S. S., & Wang, L. L. (1990). Statistical analysis of rapid testing for low-voltage electric motors. *Chinese Journal of Applied Probability and Statistics*, *6*(1), 108–112. (in Chinese).
Shi, Z. X., & Mao, S. S. (1993). The application of Bayesian approach to assessment of fatigure life the rooling bearing. *Journal of Luoyang Institute of Technology*, *14*(2), 21–25. (in Chinese).
Mao, S. S., Xia, J. F., & Guan, W. Q. (1993b). Assessment of the invalid data in bearing life tests. *Chinese Journal of Applied Probability and Statistics*, *9*(3), 326–331. (in Chinese).
Diao, C. S., Zheng, G. C., Mao, S. S., Wang, L. L., & Pu, X. L. (1995). Statistical analysis of reliability life tests of sensors. *Chinese Journal of Applied Probability and Statistics*, *11*(1), 109–112. (in Chinese).