TERMS OF REFERENCE FOR R&D PROJECT

1. TITLE

Review of Indian Standards on Data Presentation, Visualization, Summarization, Analysis and Fitting with Statistical Distribution Models.

2. BACKGROUND

2.1 Bureau of Indian Standards (BIS), engaged in activities of standardization, quality control and certification marking; had recognized the importance of statistical quality control (SQC) from the very beginning and established a Sectional Committee [the then Indian Standards Institution (ISI)]. This Sectional Committee "Statistical Methods for Quality, Data Analytics and Reliability" (MSD 3) has been preparing Indian Standards relating to statistical techniques, data analytics and reliability with an idea of propagating their knowledge in industry and promoting their application for quality improvement. This Committee coordinates with the work of ISO/TC 69 `Application of Statistical Methods

2.2 Some of Indian Standards under the purview of MSD 3 are now outdated and may no longer reflect contemporary practices. The goal of this R&D project is to revise these standards, ensuring they align with the latest practices in use both nationally and internationally.

2.3 This R& D project is designed to review following Indian Standards**:**

Sl. No.	**IS No.**	**Title**
1.	IS 7200 (Part 1): 2019	Presentation of statistical data Part 1 tabulation and summarization Third Revision
2.	IS 7200 (Part 2): 1975	Presentation of statistical data: Part 2 diagrammatic representation of data
3.	IS 9300(Part 1) :1979	Statistical models for industrial applications Part 1 discrete models
4.	IS 9300(Part 2) :1989	Statistical models for industrial applications Part 1 continuous models

2.3 The above Indian Standards are fundamental in establishing the aspects to be considered before and during data collection, summarization, presentation, and analysis. They serve as guidelines across various industries whether manufacturing or services as large volumes of data are generated and utilized. Drawing meaningful and correct inferences from this data is essential to achieving organizational goals, such as reducing defects or enhancing profitability.

2.4 This process requires careful determination of factors like the methodology, type of data, locations, and quantity to ensure the data gathered is relevant and actionable. Proper summarization and presentation of data are equally important, as they should effectively communicate key insights through clear visualizations and concise summaries, making complex information easy to understand.

2.5 Once data is summarized and before drawing conclusions, the pattern of the data needs to be determined. These patterns follow some statistical models, like attributes data may follow Binomial or Poisson model, whereas continuous data may follow normal, exponential, Weibull

models. Many organizations also leverage this data for predictive models, relying on analysis to forecast trends and outcomes. The above four Indian Standards play a critical role in supporting these objectives by providing a robust framework for managing and interpreting data effectively.

2.6 The scopes of the above standards are given in Annex A

3 OBJECTIVES

Since the publication of these Indian Standards, there have been significant advancements in techniques, technology, and the definitions of various terms. Therefore, the primary objectives of this project are to

a) **Revise Indian Standards** to incorporate the latest practices currently being used internationally.

b) **Harmonize the terminology** to align with the most recent Indian and ISO standards.

c) **Include industry-specific examples** from various sectors to enhance the relevance and applicability of these standards.

d) **Simplify the language** of the Indian Standards to ensure they are easily understood and implemented by the industry.

e) **Support the Indian industry** in improving the quality of its products and services through the updated standards.

4 SCOPE

The scope of this R&D project is to present report on outcome from the study to review each of the aforementioned Indian Standards, taking into account the latest technology, techniques, tools, and terminology available in these areas. The revised standards will include practical examples from various industrial sectors and will be written in clear, user-friendly language, ensuring they are easily understandable by the general user and applicable across industries.

5. RESEARCH METHODOLOGY

5.1 Literature Review

The following tasks are to be undertaken as part of this R&D project:

a) **Review each of the identified Indian Standards** alongside the corresponding ISO standards, if any, covering the same or similar subjects.

b) **Identify and analyse regional or national standards** from other countries in the absence of relevant ISO standards.

c) **Examine other Indian Standards** published after the release of the standards under revision to assess the feasibility of merging them where applicable.

d) **Review available research papers** on the subject to gather additional insights and perspectives.

e) **Explore information from other reliable sources**, if available, to enhance the understanding of the subject.

f) **Compare the terminology** used in the existing Indian standards with that of the latest Indian and ISO standards to identify any changes or updates needed.

5.2 Field survey and Data collection

Based on the literature review, a questionnaire will be developed for each Indian Standard and circulated to various organizations that are currently implementing these standards. The questionnaire will aim to gather feedback on the practical applicability of the standards, identify areas for improvement, and assess the need for updates.

5.3 Field visit

A detailed justification for the field visit, including the Number and details of industry/companies/organizations, purpose, duration, and expected outcomes, shall be submitted to BIS for consideration and approval in advance.

5.4 Analysis and report preparation

5.4.1 Analytical Report Preparation

The proposer is expected to prepare an analytical report for each standard, addressing various aspects of the scope and supporting the analysis with relevant data. The data collected should be thoroughly analysed, and conclusions drawn from the analysis should be included in the report. The report should address the following points:

a) Identification of any standards (or portions of other standards) that could be merged, if applicable.

b) Identification of gaps or shortcomings in the current standard.

c) Recommendations for changes to be incorporated in the standard.

d) Proposed additions to the standard, including their specific location within the document.

5.4.2 Submission of Report

The proposer shall submit a comprehensive report covering the points listed above, along with a proposed revised draft of the standard, incorporating all suggested changes and updates, to the Bureau of Indian Standards (BIS) for review.

6 OUTLINE OF THE TASKS AND FINAL DELIVERABLES EXPECTED FROM THE PROPOSER(S):

6.1 Project Report Submission

The project report should cover all points mentioned in Clause 5, including a revised draft of the standards that incorporates the proposed changes. The report must be submitted in both hard and soft copies, along with digital formats, ensuring that it addresses all aspects outlined in the project scope.

6.2 Appendices to the Report

The project report should include the following as appendices:

a) Responses to the questionnaires from various organizations.
b) Records of discussions held during any on-site visits, if applicable.
c) Data collected during the study and its corresponding analysis.

7 DELIVERY MILESTONES AND REVIEW PROCESS

Timeline for the project is 6 months from the date of award of the project.

8. STAGES FOR REVIEW

8.1 Stage I: Comprehensive Planning (End of 2nd Month)

By the end of the 2nd month, the proposer shall prepare a comprehensive plan that includes the following:

a) A detailed list of the standards and other documents reviewed, accompanied by a summarized report.

b) Identification of various organizations, stakeholders, beneficiaries, and regulators to be visited, along with confirmation of their consent.

c) A description of the information to be collected through interactions with the identified stakeholders and details of the planned visits. The proposed format for gathering information should be shared with BIS for review.

BIS will evaluate the plan and provide feedback as necessary.

8.2 Stage II: Draft Report Submission (End of 5th Month)

By the end of the 5th month, the project researcher shall submit a draft report to BIS that covers the points outlined in Clauses 5 and 6, including the following information:

a) Reports detailing visits conducted to different organizations.

b) Information regarding the data collected during interactions with various stakeholders.

c) An analysis of the collected data, correlating it with the findings.

d) Inferences drawn from the analysis.

8.3 Evaluation of Draft Report

The MSD 3 Sectional Committee or the concerned subcommittee or the Chairman of MSD 3, will evaluate the draft report and the revised draft of the standard. They will provide feedback and suggest changes, if needed. The proposer shall address all feedback within a maximum of one month after receiving it and submit the final report along with the revised draft of the standard.

9 SUPPORT FROM BIS

BIS will provide access to latest editions of Indian and International Standards and available literature with BIS. All expenses, as per rules, for on-site visits (to be carried out with prior approval of BIS) are included in project cost.

10 Nodal Officer

Shri Abhijit Singh, Sc. C/Dy. Director, MSD, BIS, may be contacted at msd@bis.gov.in for any queries on the research project.

ANNEX A

SCOPE OF INDIAN STANDARDS UNDER REVIEW

IS 7200 (Part 1): This standard outline the procedures of recording the data, preliminary scrutiny for elimination of discrepancies and mistakes in data, summarization of data by means of histograms, frequency distribution and computation of quantitative measures of central tendency and dispersion.

IS 7200 (Part 2): This Indian Standard deals with the diagrammatic representation of data in the form of line graphs, bar charts, pie charts, symbol charts and statistical maps.

IS 9300 (Part 1): This Indian Standard describes certain discrete statistical models, their potentiality and application in industries with illustrations. The models covered in this standard include Binomial, Multinomial, Poisson and Hyper geometric.

IS 9300 (Part 2): This Indian Standard describes most commonly used continuous statistical models, their potentiality and application in industries with illustrations. The models covered in this standard include Normal, Exponential, Gamma, Weibull and Lognormal.