

Decision Analysis For Petroleum Exploration

The accelerated growth of the world population creates an increase of energy needs. This requires new paths for oil supply to its users, which can be potential hazardous sources for individuals and the environment. Risk Analysis for Prevention of Hazardous Situations in Petroleum and Natural Gas Engineering explains the potential hazards of petroleum engineering activities, emphasizing risk assessments in drilling, completion, and production, and the gathering, transportation, and storage of hydrocarbons. Designed to aid in decision-making processes for environmental protection, this book is a useful guide for engineers, technicians, and other professionals in the petroleum industry interested in risk analysis for preventing hazardous situations.

This volume reviews and reappraises the value and impact of outcrop-based fieldwork in hydrocarbon exploration, appraisal, development and production. There has been a resurgence in the use and need for outcrop-based research as analogues and benchmarks for subsurface overburden and reservoir studies, and digital technologies combined with traditional methods are revolutionizing this area of field-studies.

Economic Risk in Hydrocarbon Exploration provides a total framework for assessing the uncertainties associated with exploration risk from beginning to end. Numerous examples with accompanying microcomputer algorithms illustrate how to quantitatively approach economic risk. The text compares detailed assumptions and models of economic risk, and presents numerical examples throughout to facilitate hands-on calculations using popular spread-sheet packages on personal computers. Covers economic risk from exploration through production models Brings methods to a level where all can be done on a PC Analyzes numerical examples from the real world Removes "mystery" from how economics is done Addresses assumptions in models and shows how they influence projections

A guide to quantitative tools, techniques, and best practices for feasibility analysis, estimation, and project risk management.

This Third Edition of Elements of Petroleum Geology is completely updated and revised to reflect the vast changes in the field since publication of the Second Edition. This book is a useful primer for geophysicists, geologists, and petroleum engineers in the oil industry who wish to expand their knowledge beyond their specialized area. It is also an excellent introductory text for a university course in petroleum geoscience. Elements of Petroleum Geology begins with an account of the physical and chemical properties of petroleum, reviewing methods of petroleum exploration and production. These methods include drilling, geophysical exploration techniques, wireline logging, and subsurface geological mapping. After describing the temperatures and pressures of the subsurface environment and the hydrodynamics of connate fluids, Selley examines the generation and migration of petroleum, reservoir rocks and trapping mechanisms, and the habit of petroleum in sedimentary basins. The book contains an account of the composition and formation of tar sands and oil shales, and concludes with a brief review of prospect risk analysis, reserve estimation, and other economic topics. Updates the Second Edition completely Reviews the concepts and methodology of petroleum exploration and production Written by a preeminent petroleum geologist and sedimentologist with decades of petroleum exploration in remote corners of the world Contains information pertinent to geophysicists, geologists, and petroleum reservoir engineers Updated statistics throughout Additional figures to illustrate key points and new developments New information on drilling activity and production methods including crude oil, directional drilling, thermal techniques, and gas plays Added coverage of 3D seismic interpretation New section on pressure compartments New section on hydrocarbon adsorption and absorption in source rocks Coverage of The Orinoco Heavy Oil Belt of Venezuela Updated chapter on unconventional petroleum

Engineers seek solutions to problems, and the economic viability of each potential solution is normally considered along with the technical merits. This is typically true for the petroleum sector, which includes the global processes of exploration, production, refining, and transportation. Decisions on an investment in any oil or gas field development are made on the basis of its value, which is judged by a combination of a number of economic indicators. Economic Analysis of Oil and Gas Engineering Operations focuses on economic treatment of petroleum engineering operations and serves as a helpful resource for making practical and profitable decisions in oil and gas field development. Reflects major changes over the past decade or so in the oil and gas industry Provides thorough coverage of the use of economic analysis techniques in decision-making in petroleum-related projects Features real-world cases and applications of economic analysis of various engineering problems encountered in petroleum operations Includes principles applicable to other engineering disciplines This work will be of value to practicing engineers and industry professionals, managers, and executives working in the petroleum industry who have the responsibility of planning and decision-making, as well as advanced students in petroleum and chemical engineering studying engineering economics, petroleum economics and policy, project evaluation, and plant design.

This volume contains the edited papers prepared by lecturers and participants of the NATO Advanced Study Institute on "Statistical Treatments for Estimation of Mineral and Energy Resources" held at Il Ciocco (Lucca), Italy, June 22 - July 4, 1986. During the past twenty years, tremendous efforts have been made to acquire quantitative geoscience information from ore deposits, geochemical, geophysical and remotely-sensed measurements. In October 1981, a two-day symposium on "Quantitative Resource Evaluation" and a three-day workshop on "Interactive Systems for Multivariate Analysis and Image Processing for Resource Evaluation" were held in Ottawa, jointly sponsored by the Geological Survey of Canada, the International Association for Mathematical Geology, and the International Geological Correlation Programme. Thirty scientists from different countries in Europe and North America were invited to form a forum for the discussion of quantitative methods for mineral and energy resource assessment. Since then, not only a multitude of research projects directed toward quantitative analysis in the Earth Sciences, but also recent advances in hardware and software technology, such as high-resolution graphics, data-base management systems and statistical packages on mini and micro-computers, made it possible to study large geoscience data sets. In addition, methods of image analysis have

been utilized to capture data in digital form and to supply a variety of tools for characterizing natural phenomena.

In Volume 2: Probabilistic Models, author M. A. Mian presents the concepts of decision analysis, incorporating risk and uncertainty as applied to capital investments. In the expanded and updated second edition of Volume 2, Mian integrates new advancements and clarifies concepts to facilitate their understanding. Each topic is introduced, followed by a brief discussion related to its application in practice and a solved example. Includes a companion CD with applications, spreadsheets, and tables that expand the practical application of the book's material.

The success of any business relies heavily on the evaluation and improvement on current strategies and processes. Such progress can be facilitated by implementing more effective decision-making systems. Tools and Techniques for Economic Decision Analysis provides a thorough overview of decision models and methodologies in the context of business economics. Highlighting a variety of relevant issues on finance, economic policy, and firms and networks, this book is an ideal reference source for managers, professionals, students, and academics interested in emerging developments for decision analysis.

This book is the first in-depth guide to applying the philosophy, theory, and methods of decision analysis to creating and executing winning legal strategies. With explanations that progress from introductory to advanced and practice problems at the end of each chapter, this is a book the reader will want to use and refer to for years to come. Practicing decision analysts, operations research and management science students, attorneys and law students will find this book an invaluable addition to their knowledge and skills. John Celona has over three decades of experience in teaching and applying decision analysis. John lectures in the School of Engineering at Stanford University and is on faculty at The Stanford Center for Professional Development, the American Course on Drug Development and Regulatory Sciences, and the Academy of the American Society for Healthcare Risk Management.

Market value is set by investor behaviour ...but objective methods of valuation are vital for accurate predictions of market behaviour. What are the key issues facing the industry - and the main points the analyst needs to look for when interpreting oil industry accounts? Do the best prospects necessarily lie with the larger and better-financed companies? How best can an investment strategy be managed in the refining industry, with its conflicting pressures of environmental controls and inadequate returns? This unique and authoritative book has the answers to these and many other questions, offering a series of benchmarks and performance indicators with which to evaluate oil company shares. An updated edition of a respected and established title, it remains the only comprehensive handbook of its kind available, and will be eagerly welcomed by corporate planners as well as investors and analysts. An essential and practical guide for investors, analysts and corporate planners The only book which shows how to actually value oil and gas companies International in outlook

This is a major rework of Paul Newendorp's 1975 best-seller, which became the standard reference in the field. This book is now structured as a handbook of over 330 important concepts in risk and economic decision analysis. As the title suggests, well over half the examples apply to petroleum exploration investment decisions. Perhaps 80% of the topics are generally applicable to capital investment, project management, and operations decisions. Topics in the book represent a composite of evaluation practices and problem-solving approaches now commonly used in oil & gas and other capital-intensive industries. Several important and practical techniques were first published in the first edition. Decision analysis methods apply to any type of decision. The emphasis here is on quantitative methods useful in capital investment decisions and decisions to acquire additional information. This will be of special interest to anyone involved in the evaluation of property acquisitions, geophysical surveys, prospect drilling, and field development decisions. This book is intended for petroleum geologists, engineers, geophysicists, evaluation and planning analysts, and managers. This is not a first book in decision analysis. We presume the reader has a general familiarity with management, economics, decision analysis, and knowledge of the oil & gas industry. As a handbook we are focusing on what is most important and practical. Major topic area include the decision analysis process, key concepts in probability and statistics (including Bayes' rule and easy equivalents), decision policy (including risk policy expressed as a utility function), popular economic metrics and concepts, project and enterprise modeling, decision tree analysis, Monte Carlo simulation, and various special topics. Value of information problems receive special attention. Over 270 figures help illustrate the concepts. The expected value (EV) concept is central throughout. Most often we assume a decision policy that maximizes EV. Most of the discussion presumes a business context and measuring outcome as net present value (NPV). We also describe approaches for multi-criteria decision making including HSE. Expected monetary value (EMV = EV NPV) is the principal decision criterion used in most examples. The EV calculation incorporates judgments about risks and uncertainties expressed as probabilities and probability distributions. EV is the cornerstone of formal, quantitative analysis for decisions under uncertainty. The key calculation methods are decision trees and Monte Carlo simulation. Small decision trees can be solved with a hand calculator, while larger trees and Monte Carlo simulation usually require a computer. Software supporting these methods is now widely available as Microsoft(r) Excel(r) spreadsheet add-ins and for other platforms. The material is organized into seven sections: Decision Analysis Process, Probability and Statistics, Decision Policy, Economic Matters, Modeling, Decision Tree Analysis, and Monte Carlo Simulation. Throughout, real-world exploration examples are presented to illustrate the risk and decision analysis methods. This revised 3.0 edition features a larger page format, an updated and expanded bibliography, and an extensive glossary. We also offer additional material online, including extended discussions, software resources, and example Excel spreadsheets.

Decision Analysis for Petroleum Exploration, 3. 0 Edition

This dissertation will discuss the uncertainty encountered in the daily operations of businesses. The concepts will be developed by first giving an overview of probability and statistics as used in our everyday activities, such as the basic principles of probability, univariate and multivariate statistics, data clustering and mapping, as well as time sequence and spectral analysis. The examples used will be from the oil and gas exploration industry because the risks taken in this industry are normally quite large and are ideal for showing the application of the various techniques for minimizing risk. Subsequently, the discussion will deal with basic risk analysis, spatial and time variations of risk, geotechnical risk analysis, risk aversion and how it is affected by personal biases, and how to use portfolios to hedge risk together with the application of real options. Next, fractal analysis and its application to economics and risk analysis will be examined, followed by some examples showing the change in the Value at Risk under Fractal Brownian Motions. Finally, a neural network application is shown whereby some of these risks and risk factors will be combined to forecast the best possible outcome given a certain knowledge base. The chapters will discuss: Basic probability techniques and uncertainty principles Analysis and diversification for exploration projects The value and risk of information in the decision process Simulation techniques and modeling of uncertainty Project valuation and project risk return Modeling risk propensity or preference analysis of exploration projects Application of fractals to risk analysis Simultaneous prediction of strategic risk and decision attributes using multivariate statistics and neural networks"

The petroleum industry is enduring difficult financial times because of the continuing depressed price of crude oil on the world market. This has caused major corporate restructuring and reductions in staff throughout the industry. Because oil exploration must now be done with fewer people under more difficult economic constraints, it is essential that the most effective and efficient procedures be used. Computing Risk for Oil Prospects describes how prospect risk assessment — predicting the distribution of financial gains or losses that may result from the drilling

of an exploration well — can be done using objective procedures implemented on personal computers. The procedures include analyses of historical data, interpretation of geological and geophysical data, and financial calculations to yield a spectrum of the possible consequences of decisions. All aspects of petroleum risk assessment are covered, from evaluating regional resources, through delineating an individual prospect, to calculation of the financial consequences of alternative decisions and their possible results. The bottom lines are given both in terms of the probable volumes of oil that may be discovered and the expected monetary returns. Statistical procedures are linked with computer mapping and interpretation algorithms, which feed their results directly into routines for financial analysis. The programs in the included library of computer programs are tailored to fit seamlessly together, and are designed for ease and simplicity of operation. The two diskettes supplied are IBM compatible. Full information on loading is given in Appendix A - Software Installation. Risk 1 diskette contains data files and executables and Risk 2 diskette contains only executables. The authors contend that the explorationist who develops a prospect should be involved in every facet of its analysis, including risk and financial assessments. This book provides the tools necessary for these tasks.

A straightforward explanation of the techniques of petroleum exploration, which uses a case history of activities in the North Sea to describe essential geological and geophysical methods, drilling and logging wells, reservoir geology and petroleum reserve

This new edition of the Standard Handbook of Petroleum and Natural Gas Engineering provides you with the best, state-of-the-art coverage for every aspect of petroleum and natural gas engineering. With thousands of illustrations and 1,600 information-packed pages, this text is a handy and valuable reference. Written by over a dozen leading industry experts and academics, the Standard Handbook of Petroleum and Natural Gas Engineering provides the best, most comprehensive source of petroleum engineering information available. Now in an easy-to-use single volume format, this classic is one of the true "must haves" in any petroleum or natural gas engineer's library. * A classic for the oil and gas industry for over 65 years! * A comprehensive source for the newest developments, advances, and procedures in the petrochemical industry, covering everything from drilling and production to the economics of the oil patch. * Everything you need - all the facts, data, equipment, performance, and principles of petroleum engineering, information not found anywhere else. * A desktop reference for all kinds of calculations, tables, and equations that engineers need on the rig or in the office. * A time and money saver on procedural and equipment alternatives, application techniques, and new approaches to problems. During the 1990s, many international petroleum companies improved their exploration performance significantly by using principles of risk analysis and portfolio management, in combination with new geotechnologies.

Use big data analytics to efficiently drive oil and gas exploration and production Harness Oil and Gas Big Data with Analytics provides a complete view of big data and analytics techniques as they are applied to the oil and gas industry. Including a compendium of specific case studies, the book underscores the acute need for optimization in the oil and gas exploration and production stages and shows how data analytics can provide such optimization. This spans exploration, development, production and rejuvenation of oil and gas assets. The book serves as a guide for fully leveraging data, statistical, and quantitative analysis, exploratory and predictive modeling, and fact-based management to drive decision making in oil and gas operations. This comprehensive resource delves into the three major issues that face the oil and gas industry during the exploration and production stages: Data management, including storing massive quantities of data in a manner conducive to analysis and effectively retrieving, backing up, and purging data Quantification of uncertainty, including a look at the statistical and data analytics methods for making predictions and determining the certainty of those predictions Risk assessment, including predictive analysis of the likelihood that known risks are realized and how to properly deal with unknown risks Covering the major issues facing the oil and gas industry in the exploration and production stages, Harness Big Data with Analytics reveals how to model big data to realize efficiencies and business benefits.

Decision analysis (DA) guides executives toward logical, consistent decisions under uncertainty. This book instructs readers in applying DA to feasibility analysis, project estimation, and project risk management. This is a wholly rewritten and expanded successor to the best-selling first and second editions. The entire investment lifecycle is covered, from conception, to the project plan, to the post-project review, and to a look-back analysis of the capital investment decision. DA applies to all manner of project management (PM) decisions for individuals, government, and non-profit organizations. The book uses a business investment perspective and assumes that maximizing value for the project owner is the objective. DA is a problem-solving process. There are four key features: 1) probabilities and probability distributions express best judgments about risks and uncertainties. 2) The organization has a decision policy expressed as a single metric (the objective function). 3) Probabilities and outcome values combine in the probability-weighting expected value calculation. 4) The organization as a policy to choose the best expected value alternative. This book aims to make decision making clear, simple, and logical. A clear decision policy can be elusive, and the author offers suggestions for making trade-offs among conflicting objectives. Converting the three pillars of project management (cost, schedule, and performance) into project value equivalents makes the trade-offs clear. This book is intended for serious PM students and practitioners. This is an essential concepts and how-to book. The scope is quantitative analysis, from project inception to post-project review. Project cost and schedule modeling, in modest detail, is essential to feasibility analysis and risk management. A general background in PM and corporate planning will be helpful. The methods are quantitative and straightforward. The reader should be comfortable with basic algebra and Microsoft(r) Excel(r). The book has eight pages of Suggested Reading annotated references (plus footnote additions), over 250 figures, approximately 600 Glossary definitions, and over 2400 Index entries. Online supplements include several whitepapers and other documents, example calculation spreadsheets, detailed color images of several important figures, four videos (including a critical chain simulation), and the Utility Elicitation Program (a web app, free for most users). Key topics include: Decision trees and Monte Carlo simulation for calculating outcome distributions and expected values * Probability concepts, including Bayes' rule for value of information analysis * Popular probability distribution types and when they apply * Eliciting expert judgments, with attention to potential cognitive and motivational biases * Recognizing the three pillars project in terms of project value * A 10-step decision analysis process * Project modeling concepts and techniques, with special attention to risk drivers and other correlations * Deterministic and stochastic sensitivity analysis * Decision policy that distinguishes objectives, time value, and risk attitude * @RISK(r) with Microsoft(r) Project for project simulations under uncertainty * Logical, consistent risk policy expressed as a utility function * Merge bias when task chains converge at a merge point * Tail estimate bias when estimating highly uncertain

quantities * Optimizer's curse, a portfolio forecasting bias * Winner's curse, a bias characteristic of auctions * Using the best of critical chain and Monte Carlo simulation * Stochastic variance between a deterministic and a stochastic model * Modeling risk and uncertainty using probabilities, probability distributions, explicit formula relationships, correlation coefficients, risk drivers, conditional branching, and rework cycles.

Decision Analysis for Petroleum Exploration By Paul D. Newendorp

This book presents quantitative procedures for assessing predictions of potential oil recovery (basin size, hydrocarbon content), and economic impact (exploration cost, production, transport, and refining). Emphasis is placed on advances made in analytical methods and improved techniques developed during the last decade.

This comprehensive two-volume set provides all the necessary concepts of capital investment evaluation, capital budgeting, and decision analysis. Mian takes the reader step-by-step through the decision making process, providing comprehensive coverage of all decision analysis tools currently available while outlining how investment decisions are made under different stages of risk. Further, he focuses on practical application, using a straightforward approach with solved 'real-life' examples and solutions, end-of-chapter problems, and illustrations throughout the book. The complexity of today's risk decisions is well known. Beyond cost and risk there are many other factors contributing to these decisions, including type of risk (such as human injury or fatality), the economic impact on the local community, profitability, availability of capital, alternatives for reducing or eliminating the risk, costs of implementing alternatives, codes, standards, regulation, and good industry practice. This book presents a large range of decision aids for risk analysts and decision makers in industry so that vital decisions can be made in a more consistent, logical, and rigorous manner. Though primarily aimed at the process industry, this book can be used by anyone who makes similar decisions in other industries, including those in management science.

Decision Analysis for Management Judgment is unique in its breadth of coverage of decision analysis methods. It covers both the psychological problems that are associated with unaided managerial decision making and the decision analysis methods designed to overcome them. It is presented and explained in a clear, straightforward manner without using mathematical notation. This latest edition has been fully revised and updated and includes a number of changes to reflect the latest developments in the field.

Oil exploration is a high-risk game. With worldwide drilling success of only 10% and a typical price tag of \$15 million per well, it is no surprise the oil industry seeks better methods of managing financial risk. Geological Risk and Uncertainty in Oil Exploration answers this need by identifying the various uncertainties associated with basin analysis and incorporating this information into probabilistic models of basin evolution in relation to oil accumulation. Oil and gas explorationists, strategic resource economists, and petroleum professionals who deal with scientific uncertainty and risk issues will benefit from the book's systematic treatment of how to quantify the uncertainty associated with a variety of geological, geophysical, and geochemical problems. The origin of uncertainties associated with flexural plate motion models, dynamical models of sediment evolution, thermal models of sediment maturation, hydrocarbon kinetic models, fault models, and models of basinal sediment fill and turbidite flows are detailed in the first section. The subsequent incorporation of model uncertainties into probabilistic models of basin evolution and behavior constitutes the second half of the book. Throughout, the author interweaves a discussion of scientific probability, risk, and strategy within the context of improving our ability to assess strategic hydrocarbon resources. Key Features * Integrates quantitative knowledge of basin analysis with scientific uncertainty and economic risk to create an informed, integrated hydrocarbon exploration strategy * Instructs the reader in handling a variety of geological, geophysical, and geochemical problems by applying quantitative methods to determine uncertainty * Is student-friendly--each chapter opens with a general introduction to the subject and concludes with a review and discussion of the major concepts * Includes numerous appendices containing ancillary data, equations, and examples

Petroleum engineering now has its own true classic handbook that reflects the profession's status as a mature major engineering discipline. Formerly titled the Practical Petroleum Engineer's Handbook, by Joseph Zaba and W.T. Doherty (editors), this new, completely updated two-volume set is expanded and revised to give petroleum engineers a comprehensive source of industry standards and engineering practices. It is packed with the key, practical information and data that petroleum engineers rely upon daily. The result of a fifteen-year effort, this handbook covers the gamut of oil and gas engineering topics to provide a reliable source of engineering and reference information for analyzing and solving problems. It also reflects the growing role of natural gas in industrial development by integrating natural gas topics throughout both volumes. More than a dozen leading industry experts-academia and industry-contributed to this two-volume set to provide the best, most comprehensive source of petroleum engineering information available.

Petroleum Economics and Risk Analysis: A Practical Guide to E&P Investment Decision-Making, Volume 69, is a practical guide to the economic evaluation, risk evaluation and decision analysis of oil and gas projects through all stages of the asset lifecycle, from exploration to late life opportunities. This book will help readers understand and make decisions with regard to petroleum investment, portfolio analysis, discounting, profitability indicators, decision tree analysis, reserves accounting, exploration and production (E&P) project evaluation, and E&P asset evaluation. Includes case studies and full color illustrations for practical application Arranged to reflect lifecycle structure, from exploration through to decommissioning Demonstrates industry-standard decision-making techniques as applied to petroleum investments in the oil and gas industry A follow-up of Science Council Background Study no. 3. An analysis of the decision-making system (including an identification of social groups which should be involved) in the technological off shores activities of Labrador.

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