

Business Analytics and Data-driven Decision Making

For MBA students

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Preface

Business analytics is taught in most Indian MBA programmes as a three-credit elective of about forty sessions, and the syllabus is almost always wider than the time allows. A single course is expected to cover the concept and scope of the subject, descriptive statistics and visualization, regression and forecasting, classification and machine learning, optimization and simulation, the functional applications, and the law and ethics that now attach to all of it. Something has to give, and in most books what gives is the connection between the technique and the decision it exists to serve.

This book is organized around that connection. Every method is introduced by naming the managerial choice it settles, worked through on data a manager would recognize, and closed by returning to the decision and asking what should now be done differently. The organizing claim is that an analysis which changes nobody's action is a cost rather than an asset, and the book applies that test to itself throughout.

Four features follow from that decision.

The first is a single running case. Tarangi Retail Private Limited, a forty-two store omnichannel grocery and general merchandise chain, supplies the data for most chapters, joined by Vaayu Telecom for customer churn, by Meghdoot Finance for credit risk, and by Nandini Foods for production and supply chain. All four are fictitious, and every figure attributed to them has been constructed for teaching. The advantage of one running firm is that the context accumulates: the revenue decomposition introduced in Chapter 2 reappears as a regression in Chapter 8, as a forecast in Chapter 9, and as a staffing optimization in Chapter 12, so the student sees a business rather than a sequence of unrelated exercises.

The second is that every numerical result in the book has been computed independently and shown to the step. Worked examples give the arithmetic, not the answer alone, and the self-assessment problems progress from fully worked, through partially worked, to independent practice with complete solutions. Where a figure reports the output of software, the output is reproduced in the form the student will actually see and then annotated line by line.

The third is the treatment of tools. The syllabus marks Excel, Power BI, Tableau, Python, and R as introductory, and the book takes that seriously. Exact Excel function syntax is given, because it is stable and immediately usable. Short Python snippets are given because a manager should be able to read an analysis even if they will not write one. Power BI and Tableau are described by workflow and by the decisions their models embed rather than by menu paths, which change with every release.

The fourth is that governance and ethics are treated as part of the method. Chapter 16 sets out the Indian data protection framework, the sources of algorithmic bias, and the components of data and model governance, and the obligations are raised earlier at the points where they bite, in the chapters on classification and on people analytics. A model that cannot lawfully be deployed is not a completed analysis.

The book assumes school-level mathematics and one prior exposure to statistics for management. It does not assume programming ability. Derivations are given where they aid understanding and omitted where they do not: the simplex algorithm, matrix formulations of regression, and likelihood derivations are deliberately excluded, and the book says so at the points where a reader might expect them.

Comments and corrections from teachers and students are welcome and will improve the next edition.

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Course Objectives

1. To develop an understanding of business analytics as a discipline, its evolution, and its scope across the decision levels and functional areas of an organization.
2. To equip students to assess the sources, types, and quality of business data and to select analytical tools appropriate to a stated reporting or modelling need.
3. To build competence in summarizing and visualizing business data and in designing decision-oriented reports and dashboards.
4. To develop the ability to construct, interpret, and critically evaluate predictive models, including regression, time series forecasts, and classification models.
5. To enable students to formulate and solve prescriptive models for allocation, inventory, and pricing decisions under both certainty and uncertainty.
6. To create awareness of the applications of analytics in marketing, human resources, and finance, and of the privacy, ethical, and governance obligations that attach to analytical work.

Course Outcomes

On successful completion of this course, the student will be able to:

CO1. Explain the concept, evolution, and scope of business analytics, and distinguish descriptive, diagnostic, predictive, and prescriptive analytics in a managerial context.

CO2. Assess data types, sources, and data quality issues, and select an appropriate analytics tool for a stated business reporting need.

CO3. Summarize and visualize business data, conduct an exploratory data analysis, and design a decision-oriented dashboard with defined key performance indicators.

CO4. Build and interpret predictive models, including simple and multiple regression, time series forecasts, and classification models, and judge their fitness for a business decision.

CO5. Formulate and solve prescriptive models for resource allocation, inventory, and pricing decisions, and evaluate the ethical, privacy, and governance obligations attaching to analytics.

Syllabus

Business Analytics and Data-Driven Decision Making

Credits: 3 | Sessions: 40

Unit	Topics	Sessions	Covered in
I	Introduction to Business Analytics. Business analytics: concept, evolution, and scope. Types of analytics: descriptive, diagnostic, predictive, prescriptive. Data-driven decision making: framework and organizational adoption. Role of business analytics in functional areas (marketing, finance, human resources, operations). Data types, sources, and data quality issues. Analytics tools overview: Excel, Power BI, Tableau, Python and R (introductory).	8	Chapters 1, 2, 3
II	Descriptive Analytics and Data Visualization. Data summarization: measures of central tendency and dispersion. Data visualization principles and dashboard design. Exploratory data analysis. Introduction to Power BI and Tableau for business reporting. Case studies: sales dashboards, KPI tracking.	8	Chapters 4, 5, 6
III	Predictive Analytics. Introduction to statistical modelling for business. Regression analysis, simple and multiple, for forecasting. Time series analysis and demand forecasting. Classification techniques: logistic regression, decision trees (conceptual). Introduction to machine learning for business prediction. Case studies: customer churn prediction, sales forecasting.	10	Chapters 7, 8, 9, 10
IV	Prescriptive Analytics and Optimization. Decision analysis and optimization models. Linear programming for business decisions. Simulation techniques (Monte Carlo basics). Analytics in supply chain, pricing, and resource allocation. Case studies: inventory optimization, pricing strategy.	8	Chapters 11, 12, 13
V	Applications, Ethics, and Emerging Trends. Analytics in marketing (customer segmentation, recommendation systems). Analytics in human resources and finance (people analytics, risk analytics). Big data and business intelligence, an overview. Data privacy, ethics, and governance in analytics. Artificial intelligence and machine learning trends shaping business decision making.	6	Chapters 14, 15, 16
	Capstone: business analytics case project (student presentation).		Appendix A

How to Use This Book

For the first-time learner. Read the chapters in order. The dependency between them is real: descriptive statistics precede regression, regression precedes time series and classification, and expected value precedes simulation. Attempt the in-line check questions as you meet them rather than at the end, and work every problem marked "worked" with a pen before reading its solution.

For the reviser. Read the chapter summary first, then the tables, then the figures, and use the self-assessment as a diagnostic. Any question you cannot answer points to a section that must be reread.

For the examinee. The long-answer questions in each chapter are written in the pattern of university papers and their model answers are structured to show where the marks sit. Appendix B collects every formula in the book, Appendix C defines every term, and Appendix D is a complete model question paper.

For the teacher. Each chapter is designed to occupy between two and three sessions of the forty in the syllabus, and the mapping is given in the syllabus table above. The worked examples can be run as in-class demonstrations, and the independent problems as tutorial work. Appendix A contains a capstone project brief with a marking rubric that can be issued to students without modification.

Contents

Preface	ii
Course Objectives	iii
Course Outcomes	iv
Syllabus.....	v
How to Use This Book.....	vi
Contents	vii
1. Business Analytics: Concept, Evolution, and Scope	2
Learning outcomes.....	2
1.1 Introduction.....	2
1.2 Business analytics distinguished from its neighbours	3
1.3 The evolution of business analytics	4
1.4 The scope of business analytics	5
1.5 The analytics value chain.....	7
1.6 What analytics cannot do	8
1.7 Conventions used in this book	8
Chapter summary	9
Self-assessment	9
References.....	12
2. Types of Analytics and the Data-Driven Decision-Making Framework	13
Learning outcomes.....	13
2.1 Introduction.....	13
2.2 The four types examined.....	14
2.3 The analytics maturity progression.....	16
2.4 The data-driven decision-making framework	16
2.5 Organizational adoption.....	18
2.6 The role of business analytics in the functional areas.....	19
Chapter summary	20
Self-assessment	20
References.....	23
3. Data, Data Quality, and the Analytics Toolkit.....	25
Learning outcomes.....	25
3.1 The analytical dataset.....	25
3.2 Classification of data	25
3.3 Sources of data and the analytical pipeline.....	28

3.4 Data quality	29
3.5 The analytics toolkit.....	30
Chapter summary	33
Self-assessment	33
References.....	36
4. Data Summarization: Central Tendency and Dispersion.....	38
Learning outcomes.....	38
4.1 Introduction.....	38
4.2 Frequency distributions.....	38
4.3 Measures of central tendency.....	39
4.4 Measures of dispersion	42
4.5 Shape: skewness	44
4.6 The empirical rule and the z-score.....	45
4.7 Computing these measures in practice.....	46
Chapter summary	46
Self-assessment	47
References.....	50
5. Data Visualization and Dashboard Design	51
Learning outcomes.....	51
5.1 Introduction.....	51
5.2 The grammar of a chart.....	51
5.3 Selecting the chart from the question.....	52
5.4 How charts mislead.....	54
5.5 Principles of good chart design.....	55
5.6 Dashboard design.....	55
Chapter summary	58
Self-assessment	58
References.....	60
6. Exploratory Data Analysis and Business Reporting	61
Learning outcomes.....	61
6.1 Introduction.....	61
6.2 The exploratory sequence	61
6.3 Cross-tabulation	63
6.4 From exploration to reporting.....	63
6.5 Building the report in Power BI or Tableau.....	64
6.6 A worked reporting specification: KPI tracking at Tarangi Retail	65

Chapter summary	66
Self-assessment	66
References.....	69
7. Statistical Foundations for Business Modelling	71
Learning outcomes.....	71
7.1 Population, sample, and the problem of inference.....	71
7.2 Sampling methods.....	71
7.3 The sampling distribution and the central limit theorem.....	72
7.4 Confidence intervals	73
7.5 Hypothesis testing.....	73
7.6 Correlation	75
Chapter summary	77
Self-assessment	78
References.....	80
8. Regression Analysis for Forecasting	81
Learning outcomes.....	81
8.1 From correlation to regression	81
8.2 The simple linear regression model	81
8.3 How good is the fit?	83
8.4 The assumptions and their diagnosis	84
8.5 Multiple regression	84
8.6 Regression as a forecasting tool.....	87
8.7 Computing a regression	88
Chapter summary	88
Self-assessment	89
References.....	91
9. Time Series Analysis and Demand Forecasting	92
Learning outcomes.....	92
9.1 Introduction.....	92
9.2 The components of a time series.....	92
9.3 Smoothing and projection methods	93
9.4 Seasonality and seasonal indices	96
9.5 Measuring forecast accuracy.....	97
9.6 Selecting a method and running a forecasting process	98
Chapter summary	100
Self-assessment	100