Business Analytics

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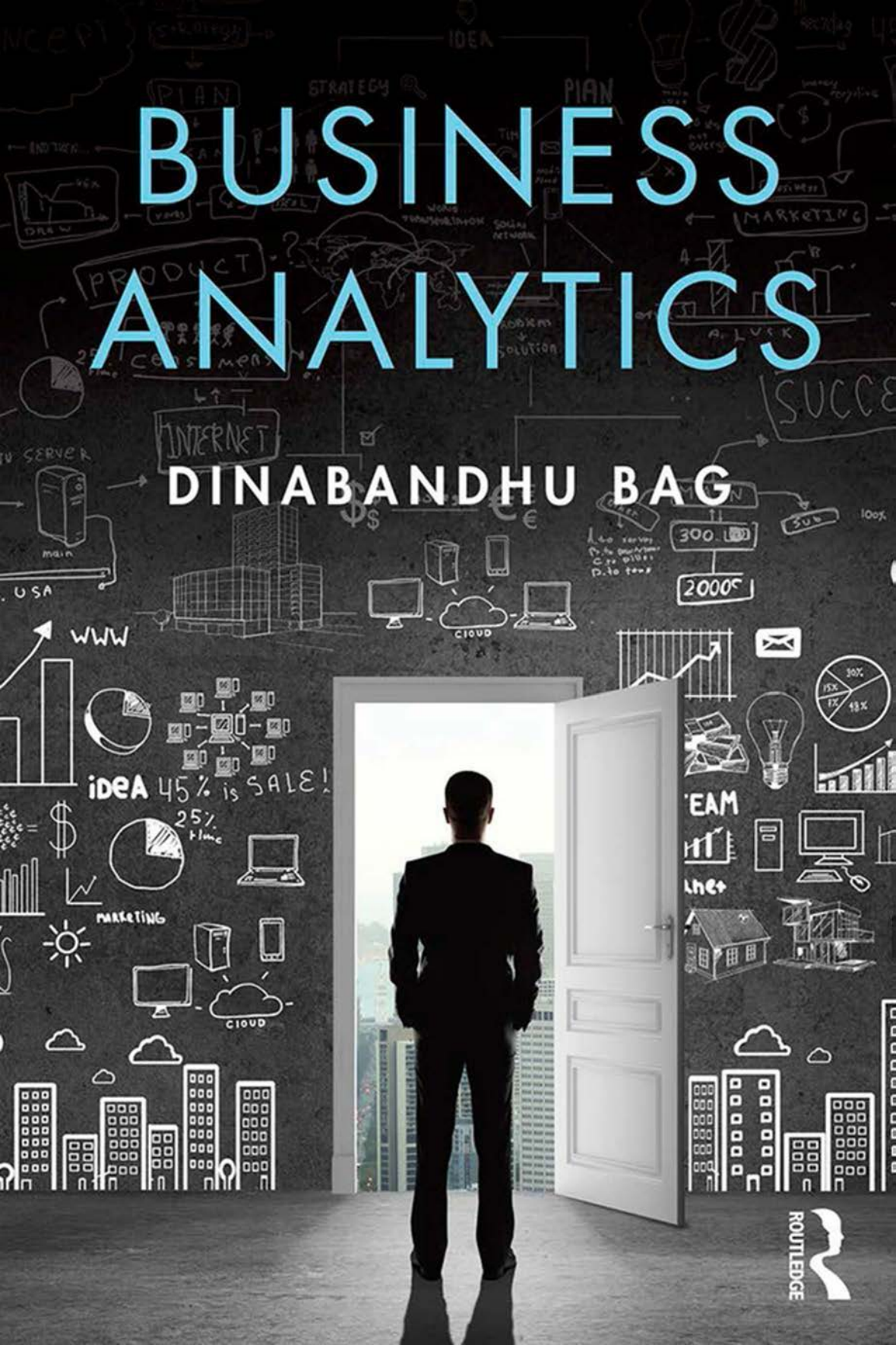

BUSINESS ANALYTICS

This book provides a first-hand account of business analytics and its implementation and an account of the brief theoretical framework underpinning each component of business analytics. The themes of the book include (1) learning the contours, scope, and boundaries of business analytics; (2) understanding the design aspects of an analytical organization; (3) providing knowledge focusing on developing business activities for financial impact through functional analysis; and (4) deriving a whole gamut of business use cases in a variety of situations to apply business analytics techniques. The book gives a complete and insightful understanding of developing and implementing analytical solutions by analyzing concrete use cases.

Dinabandhu Bag is Associate Professor in Finance at the School of Management, the National Institute of Technology in Rourkela, India. He teaches finance and economics and specializes in risk capital and financial modelling. Dr Bag has over thirteen years of industry experience implementing enterprise analytic applications for banks and financial institutions. He has worked with Oracle Financial Services Software Ltd, Bangalore; Citibank NA Global Decision Management; GE Capital International Services, Bangalore; and the Reserve Bank of India, Mumbai.

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PREFACE

Business Analytics indicates the practices and competencies for exploration and introspection of business performance to make purposive, intuitive, and expedient business decisions. Business analytics involves a plethora of analysis around business data to draw information that could be used by the managers at various levels in an organization. Business analytics enables fact-based decision making while extending accountability in decision making. Business analytics is defined as the process of looking at and summarizing data with the intent of extracting hidden predictive information. Numerous studies and much evidence exist on the benefits of business analytics for organizations[1]. Analytical projects improving productions had a median ROI of 277%; those involving financial management had a median ROI of 139%, involving customer relationship management had a median ROI of 55%. Similarly, the median ROI of predictive analytics projects were 145% compared to non-predictive projects at 89%.

Thus, this book deals with the science and art of business analytics with special emphasis on financial analytics and also provides the theoretical foundations and context for various elements of business analytics in specific situations. To highlight aspects of implementation, this book will show the reader how leading companies use the power of analytics to improve their investments. Often scientific knowledge alone cannot make good decisions unless combined with knowledge of the business with the best information available. Quantitative methods can help managers evaluate more strategic choices using tools. While many traditional academic texts mostly focus on quantitative methods, very few cover analytics for non-quantitative managers, which this book aims to correct.

Note

1 International Data Corporation. (2003). *The Financial Impact of Business Analytics: Key Findings* (IDC No. 28689, January 2003). Framingham, MA: International Data Corporation.

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I am also grateful to all the researchers who have contributed to the literature and guided the direction of this study. I am thankful to leading professional magazines and sources that provide periodic industry reviews and highlight the impending needs of business.

All errors and omissions remain the sole responsibility of the author.

HELPING YOU LEARN

Key features

- Highlights of functional analytics that cover components of major business areas and industries
- Focus on specific topics of human resource management, purchase, delivery, production, fulfilment, trading, investment, risk management, collections, marketing, audits, retail stores, etc.
- Concrete use cases with step-by-step calculations and detailed interpretations
- Discussion of common issues in implementation
- Sample field data to illustrate business analytics at work

End-of-chapter resources

- Summary and key questions
- Examples
- Test questions
- Selected bibliography

End-of-book resources

- Appendixes with sample data
- Glossary with definition of terms

ABBREVIATIONS

B2B	business to business
B2C	business to customer
CAR	capital adequacy ratio
ELS	economic level of stocking
EOQ	economic order quantity
ER	exchange ratio
FCFR	free cash flow ratio
G2B	government to business
IPO	initial public offering
IRR	internal rate of return
LBO	leverage buy-out
LLR	log likelihood ratio
MBO	management buy-out
MLE	maximum likelihood estimate
NWC	net working capital
P/E	price to earnings ratio
ROI	return on investment
ROTA	return on total assets
SKU	stocking unit

1

INTRODUCTION

Traditionally, business choices have been considered purely as an art, an erudite talent that is acquired over a period of time through experience. It has been so regarded because a variety of individual styles can be observed in the handling and successful solving of common business problems in actual businesses. However, the environment in which management must operate is more complex and fast changing. This calls for driving the art of business processes by scientific and objective methods. A theoretical and methodical business approach to business processes is necessary because today's business environments are far more intricate and heterogeneous than in the past and because the cost of making errors is far too high. Conventional tools are intuitional and judgmental so long as they rely on individual opinions. Common sense may be misleading, and snap judgments may have painful consequences. The conviction of individual opinions is strengthened by using business analytics to avoid the repercussions of costly errors across the enterprise. Therefore, the business problem can be articulated well by collecting relevant facts, by experimenting with potentially fruitful alternatives, and by implementing disruption.

Plan of the book

As the title suggests, this book is an introduction to business analytics and a theoretical aid to business decision making. Descriptions of business problems, important analytical techniques that can be deployed by managers in business situations, and the results of alternatives are embodied in the text of this book. There are ten chapters in this book, which are arranged in accordance with the functional depth of learning. Chapter 2 is devoted to describing business roles in an organization and presents an overview of the variety and levels of functional consumers of analytics, their end uses, and the hierarchical relationships of their consumption and

intensity. Chapter 3 focuses on the aspects of functional analytics and the nature, intensity, engagement, periodicity, and strategic benefits that a business derives from using each of the independent components of functional analytics. Chapters 4 through 8 cover four major and critical functional areas in analytics that are suitable for businesses. Businesses may adopt one or all of the domains of analytics mentioned in Chapters 4 through 8. For example Chapter 4 starts with a detailed discussion on human resources analytics, which covers the "people" element of an organization, including employee life cycle, performance, and retention; talent management, rewards and compensation, and satisfaction. Chapter 5 covers supply chains and e-financial supply chains in business, with a special emphasis on inventory, distribution, working capital, stock planning, demand planning, and a plethora of inquiries around procurement cycles of a business. Chapter 6 covers customer analytics for a business, which encompasses details about customer acquisition, product holding, cross-selling, satisfaction, lifetime value, retention, and the customer resolution aspects of the business. Chapter 7 covers business processes that are critical for the smooth functioning of the business, such as operations, branches, campaigns, sales, marketing, quality, IT services, service resolutions, and re-engineering, which are applicable across both the service and manufacturing industries. Chapter 8 elaborates on financial analytics and on a host of tools around measuring the incremental financial impact of business decisions, such as pricing, mergers-demergers, valuation, spread, liquidity, asset liability, interest rate analysis, etc., to empower modern-day managers to understand incremental value from investments. Chapter 9 is especially focused on the implementation aspects of analytics, which are aimed at the skills, generating evidence and demonstrating the utility, organizing teams and handling the hurdles preventing the implementation of analytical solutions in a business. Chapter 10 supplements the text by giving use cases with detailed reports of results and their interpretation aimed at five industrial sectors, such as banking, financial services, and insurance (BFSI), manufacturing, services, hotel chains, retail chains, etc. The Appendixes give an overview of the formulae, derivations, measures in business and statistics, and example data.

This first chapter introduces the subject of business analytics by giving simple definitions of business analytics and by also explaining the goals, characteristics, and domains of business analytics.

Business analytics

Business analytics is defined as the process of understanding the data-driven activities of a business to draw inferences to make calculated decisions with higher certainty. Business analytics encompasses a gamut of analysis around business data to draw information that could be used by the managers at various levels in an organization. Business analytics enables fact-based decision making while extending accountability in decision making. Business analytics is *defined as* the process of exploring, experimenting, simulating, and summarizing data to extract information.

With the advent of real-time warehousing and web capabilities in business systems, business analytics has evolved as a practical choice for strategic business decisions. Is there any difference between business analytics and business intelligence? Business intelligence is generic and applies to any situation of discovery using data. Business analytics goes well beyond mere presentation of data and statistics. The essence of analytics lies in the application of logic and processes to find meaning in data. Through these processes, managers create activities that define intelligence, including the ability to identify, locate, predict, relate, innovate, and learn to recommend choices, which also encompass statistical analysis. Business analytics needs drivers, leaders, or business analysts who would apply the logic and processes described here in the text. Business analytics is one portion or component of business intelligence. Conventional data warehousing and reporting ends at the stage of report delivery. Business analytics extends through the value-added knowledge stage, which in turn supports decisions and makes life easier for businesses. Hence, business analytics measures the results that are produced and provides a feedback loop that facilitates organizational learning. With its ever-increasing popularity, business analytics has become more important and useful to a business manager.

Goals of business analytics

Business analytics encompasses the entire key informational and decisional attributes of any business, and it is vitally important that business analytics features in the overall strategic vision of all businesses.

The major goals of business analytics include:

- Providing real-time, actionable information aimed at superior business decision making.
- Providing tools at all levels of an organization to help decision making around customer goals and profits while comparing performance.
- Providing analysis that helps the business forecast the future with greater objectivity and accuracy.
- Providing the insight and understanding to support informed decisions and confident actions and providing the feedback that is needed to create a learning organization.

The following characteristics of business analytics identify its uniqueness:

- *Purposive:* Business analytics needs to purposefully know why we make deliveries and perform the analytics. The understanding derived from analysis must align with business functions (finance, marketing, sales, etc.) and with the issues and objectives of management (performance, growth, compliance, risk, profitability, etc.).
- *Intuitive:* Business analytics are insightful, and they help uncover new facts or information and help managers become aware of previously hidden patterns.

Cause-and-effect association is often the most valuable in business decision making. Analytics that simply confirm the status quo or reaffirm conventional wisdom offer no insight.

- *Expedient:* An expedient output or action plan makes an application doable and possible, which means a business manager should be able to act upon the recommendations of an insight.

Domains of business analytics

Domains refer to the variety of activities within a business. The business analytics is built around (but not limited to) the following analytical domains:

- Human resource analytics
- Supply chain analytics
- Customer analytics
- Business processes analytics
- Financial analytics

Human resource analytics is defined as the analysis of human resources (employees), which embodies the entire life cycle of an employee, such as recruitment, managing performance, incentives, and employee engagement. Using the right metrics can improve policies and procedures, increase team members' satisfaction and retention, focus employee training and support, improve morale, reduce costs, and increase productivity. The activities impacted by human capital involve recruitment, training, employee relationships, employee satisfaction, and turnover.

Supply chain analytics refers to the analysis of a firm's delivery processes, which includes acquisition of vendors, the sourcing of factors, inventory analytics, transportation and customer delivery network efficiency, vendor management, and sourcing efficiency. The baseline for strategic sourcing initiatives is as an enabler for process improvement. Further, supply chain analytics is a measurement device for cost-reduction programs, providing comprehensive spend visibility of both direct and indirect expenses on commodities and services, significant cost-saving opportunities through supplier and commodity consolidation and enhanced compliance through effective spend and supplier monitoring.

Customer analytics is an understanding of customers, the customer life cycle, their product needs, and customer satisfaction. Customer analytics is the systematic interpretation of a business's customer information to retain profitable customers and proactively build relationships with them. Customer behavioural analysis seeks to identify and weigh the relative importance of the factors customers use to choose one product over another. Customer profiling is a tool that helps business better understand customers so they can increase sales and grow their business. Customer profiles can also help develop targeted marketing plans and ensure that products meet the needs of their intended audience. By understanding the

variables that influence individual decisions, businesses are more able to influence their outcome. Customer decision making will rely heavily on considerations using individuals as the unit of analysis.

Business process analytics refers to the activity flows of product or service deliveries within an organization to improve processes and productivity. Much of what will follow in this chapter will reply on the systems perspectives on the decision-making process described in Figure 1.1.

Financial analytics is defined as the analysis of the financial impact of business analytics. One aspect of financial analytics is the opportunity of working with net (final) figures, which are derived after taxes, duties, levies and penalties, or capital charges are charged to the business. It embodies the versatility of the risks of doing business and also translates such risks to net turnout. Financial analytics enables business to maintain cash flow, spread and liquidity; manage pricing value acquisitions; control investments in new products and working capital; and plan funds and directed investments. Improving financial performance and expense control, through organized monitoring of expenses, drives profitability across business units, geographic locations, products, or channels.

Therefore, the flavours of analytics encompass both simple buy-and-sell decisions in a treasury and larger buy-and-sell decisions, i.e. for valuations in a corporate merger and in an acquisition. Therefore, business choices are driven by goals that are set by top management (e.g. chief experience officers [CXOs] or the board of directors [BOD]), and functional managers, including the agents (e.g. analysts), act upon a tactical situation to freeze on a choice. Newer choices are generated

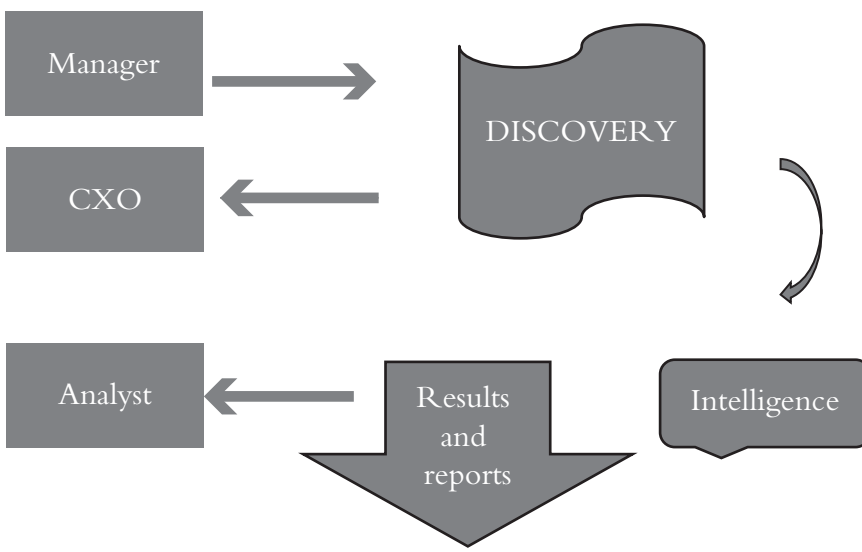

FIGURE 1.1 Choice-making process in business organizations

when a fixed set of choices do not suffice to fulfil the given goals, which is an iterative process, and this requires exchange transfer of information among all three. Discovering a feasible choice will be implemented only when it is visualized by CXOs, and hence the process of decision making is well understood in the context of a system shown in Figure 1.1. The onus of action lies with the agents, and whether they have acted successfully or not is displayed from the results and reports.

Tables 1.1 and 1.2 summarize the contours of business analytics and the engagement map of business analytics. The contours shown in Table 1.1 present the principal goals of a given type of analytics, which are no different from the goals of the business. Each type of analytics will ensure skilled teams comprising of personnel to attain primarily the goals of analytics (e.g. HR, marketing, finance, etc.), which in aggregate condenses to a larger business goal. This means the alignment of analytics' focus should be in tune with the target goals of business, and in no situation is the period of review or the maturity of the impact or the investment unmatched with the strategy.

Table 1.2 presents the engagement map of analytics by describing individual components in each analytics type (e.g. sourcing, retention, sales force, etc.) and the associated benefits to end users. End users could be internal or external to the business, and this simplifies the justification of the rationale for investments in people, resources, processes, data infrastructure, and support systems, which will hold the foundation of analytical competency within the business. Somewhere or another, the business gets sufficient reason to build a newer value proposition for its stakeholders, such as customers, suppliers, employees, regulators, or others.

TABLE 1.1 Contours of business analytics

Analytics	*Objectives*
Human resource analytics	To gain focus on employee engagement, deployment, performance evaluation and attrition management
Supply chain analytics	To manage cost savings with better sourcing by allocating sourcing channels to superior performance tasks
Customer analytics	To manage the customer life cycle, customer intelligence, customer service and satisfaction
Business processes analytics	To drive the business processes to deliver quality under timeliness with superior performance targets on collections, credit underwriting, production, conversion, machining, seasoning and so on
Financial analytics	To measure the financial impact of business decisions such as pricing, mergers and demergers, valuation, spread, liquidity, asset liability, interest rate management, etc. to empower modern-day managers to understand the incremental value of investments

TABLE 1.2 Engagement map of business analytics

Analytics type	*Purpose*
Human resource analytics	Managing human capital
Employee performance	Managing employee performance
Staffing and scheduling	Managing employee productivity
Supply chain analytics	Managing supply networks better
Sourcing analytics	Vendor management
Supplier rating	Vendor risk management
Inventory analytics	Inventory management
Customer analytics	Unified customer value management
New business and acquisition	New portfolio management
Business process analytics	Resilience, response and agility of delivery
Collections and recovery analytics	Recovery management
Risk analytics	Risk management
Marketing analytics	Marketing process
Portfolio analytics	Business management
Sales analytics	Sales planning and sales force management
Spatial analytics	Accuracy and timeliness in delivery
Channel analytics	Improve channel efficiency and return on investments and brand equity

In each of these domains, the following relevant thoughts are explored to achieve the goals outlined:

- What does the analytics imply for or impact on the business?
- What do the results of the analytics indicate for the manager responsible on the ground?
- Is analytics validated?
- Does analytics comply with the values of the company?
- Should analytics be used independently or in conjunction with other related aspects?

Applied questions

Which of the domains of business analytics is the most appropriate for ensuring "people" strength in a business? What are the engagement areas for satisfying such needs in a business?

The people in a business form its human capital and are the regular employees of the business who provide the strength and contribute to meeting the business goals mandated by top management. The focus of people management aims at human resources analytics, and the suggested areas of engagement are staffing, scheduling, employee productivity, etc. The distinct focus of engagement can ensure the completeness in achieving the "people" goals of a business.

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