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CERTIFICATION COURSES

Business Analytics for Management Decision

Introduction to Business Analytics

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Introduction to Business Analytics

- ✓ What is Business Analytics?
- ✓ Evolution of Business Analytics
- ✓ Classification of Business Analytics
- ✓ Trends of Business Analytics
- ✓ Framework of Business Analytics
- ✓ Scope of Business Analytics
- ✓ Data for Business Analytics
- ✓ Decision Models
- ✓ Problem Solving and Decision Making

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What is Business Analytics (BA)?

Business Analytics is the discovery and communication of meaningful patterns of data and that to business-related problems.

It is the scientific process of transforming data into insight for making better decisions (INFORMS).

[data => information => knowledge => wisdom]

BA is the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions (Davenport and Harris).

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What is Business Analytics (BA)?

BA is the use of:
data,
information technology,
statistical analysis,
quantitative methods, and
mathematical or computer-based models
to help managers to gain improved insight about their business operations and make better, fact-based decisions.

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Business Analytics Applications

- Pricing decisions
- Financial and marketing activities
- Supply chain management
- Management of customer relationships
- Human resource planning
- Enterprise resource planning

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Importance of Business Analytics

- There is a strong relationship of BA with:
  - profitability of businesses
  - revenue of businesses
  - shareholder return
- BA enhances understanding of data
- BA is vital for businesses to remain competitive
- BA enables creation of informative reports

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Evolution of Business Analytics

- Time study exercise by Taylor
- Operations research (OR)
- Management science (MS)
- OR and MS with ICT
- Business intelligence
- Decision support systems
- Personal computer software

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Classification of Business Analytics

- **Descriptive analytics (DA)**

  - uses data to understand past and present

[prepares and analyzes historical data; identifying patterns from samples]

- **Predictive analytics (PA)**

  - analyzes past performance

  - predict future [probabilities and trends]

  - exploring relationship in data, which may not visible directly by DA.

- **Prescriptive analytics**

  - uses optimization techniques [determining new ways to evaluate, target business objectives with balancing possible constraints]

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Trends in Business Analytics

- **Diagnostic analytics**
  - Why did it happen
  - How did it happen
  - Mostly it is a shocks and market information
- **Descriptive analytics (DA)**
  - What is happening (standard reporting)
  - How many; how often, where (ad hoc reporting)
  - What exactly the problem (drill down)

Three basics:

Information, **analysis** and **decisions**

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Trends in Business Analytics (Cont.)

- **Predictive analytics (PA)**
  - what actions are required (alerts)
  - what could happen (simulation)
  - what if the trend continues (forecasting)
  - what will happen the next (predictive modelling)
- **Prescriptive analytics**
  - how can we achieve the best outcome (optimization)
  - how can we achieve the best outcome w.r.t. effects of variability (stochastic optimization)

It is a game between **information** and **analysis.**

Analytics excellence leads to better decisions (Gartner)

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Optimize Funnel Conversion

Big data analytics allows companies to track leads through the entire sales conversion process, from a click on an adword ad to the final transaction, in order to uncover insights on how the conversion process can be improved.

EXAMPLE:

CREDEM uses Data Analytics to predict which financial products or services a customer would appreciate, so it can better target consumers during the sales process. With these insights, the bank increased average revenue by 22 % and reduced costs by 9 %.

CREDEM BANCA

La forma e la sostanza.

Company	Industry
Credem	Finance

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Behavioral Analytics:

With access to data on consumer behavior, companies can learn what prompts a customer to stick around longer, as well as learn more about their customer's characteristics and purchasing habits in order to improve marketing efforts and boost profits.

EXAMPLE

McDonalds tracks vast amounts of data in order to improve operations and boost the customer experience. The company looks at factors such as the design of the drive-thru, information provided on the menu, wait times, the size of orders and ordering patterns in order to optimize each restaurant to its particular market

Company	Industry
McDonalds	Food & Beverages

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Customer Segmentation

By accessing data about the consumer from multiple sources, such as social media data and transaction history, companies can better segment and target their customers and start to make personalized offers to those customers.

EXAMPLE:

Walmart combines public data, social data and internal data to monitor what customers and friends of customers are saying about a particular product online. The retailer uses this data to send targeted messages about the product, and to share discount offers. Walmart also uses data analysis to identify the context of an online message, such as if a reference to "salt" is about the movie or the condiment.

Walmart
Save money. Live better.

Company	Industry
Walmart	Retail

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Predictive Support

Through sensors and other machine-generated data, companies can identify when a malfunction is likely to occur. The company can then pre-emptively order parts and make repairs in order to avoid downtime and lost profits.

EXAMPLE:

Southwest analyses sensor data on their planes in order to identify patterns that indicate a potential malfunction or safety issue. This allows the airline to address potential problems and make necessary repairs without interrupting flights or putting passengers in danger.



Company	Industry
Southwest airlines	Travel

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Market Basket Analysis & Pricing Optimization

By quickly pulling data together from multiple sources, retailers can better optimize their product selection and pricing, as well as decide where to target ads.

Example

P&G uses simulation models and predictive analytics in order to create the best design for its products. It creates and sorts through thousands of iterations in order to develop the best design for a disposable diaper, and uses predictive analytics to determine how moisture affects the fragrance molecules in dish soap, so the right fragrance comes out at the right time in the dishwashing process.



Company	Industry
Procter & Gamble	Household Retail

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Cont

EXAMPLE:

...

Coca-Cola uses an algorithm to ensure that its orange juice has a consistent taste throughout the year. The algorithm incorporates satellite imagery, crop yields, consumer preferences and details about the flavours that make up a particular fruit in order to determine how the juice should be blended.



Company	Industry
Coca-Cola Co.	Food

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Predict Security Threats

Big data analytics can track trends in security breaches and allow companies to proactively go after threats before they strike.

Example:

With more than 1.5 billion items in its catalog, Amazon has a lot of product to keep track of and protect. It uses its cloud system, S3, to predict which items are most likely to be stolen, so it can better secure its warehouses.

amazon.com

Company	Industry
Amazon	Online Retail

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Fraud Detection

Financial firms use big data to help them identify sophisticated fraud *schemes by combining multiple points of data.*

Example

Eg: Zions Bank uses data analytics to detect anomalies across channels that indicate potential fraud. The fraud team receives data from 140 sources—some in real-time—to monitor activity, such as if a customer makes a mobile banking transaction at the same time as a branch transaction.



Company	Industry
Zions Bank	Finance

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More Examples

Sensors placed on John Deere equipment, along with historical and real time data on soil conditions, the weather and crop features are all used together to help farmers determine where and when to plant to get the highest yield, and how to boost the efficiency of their work to reduce fuel costs.



Company	Industry
John Deere	Farming

Aurora collects internal as well as national data in order to create a benchmark for healthcare quality. It also analyzes data on groups of patients with similar medical conditions, to reveal trends in the diseases and to identify the right candidates for medical research. Finally, the real-time data analysis allows Aurora to predict and improve patient outcomes, and so far has reduced readmissions by 10%



Company	Industry
Aurora Health Care	Health Care

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Framework of Business Analytics

- **Statistics**
  - descriptive statistics
  - inferential statistics
  - forecasting
  - modelling
- **Quantitative methods**
  - Simulation
  - optimization
  - modelling
- **Information systems for business intelligence**
  - Big data, small data
  - data marts, spreadsheets
  - modelling

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Step-wise Process of Business Analytics

- Problem identification
- literature review
- hypotheses setting
- modelling
- Data collection
- Data structuring
- Data Analysis
- Reliability and validity
- Results and discussion
- Robustness
- Sensitivity analysis
- Inferences

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Why Business Analytics

- **Analytical Approach**
- **Non-analytical approach (Delphi Technique/ Grounded theory)**

Analytical approach is better choice than non-analytical approach

Why????

Using data to derive conclusions/decisions can deliver a significant higher chance of making a good, long-lasting decision over non-data driven approach.

More useful Applications as per the current requirements:

Risk management, fraud detection, revenue management, healthcare management

Advantage:

Time saving, cost saving, more productive, competitive advantage, increased customer satisfaction, expanded sales/profits, etc.

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Scope of Business Analytics

Example 1.1 Retail Markdown Decisions

- Most department stores clear seasonal inventory by reducing prices.
- The question is:
  When to reduce the price and by how much?
- Descriptive analytics: examine historical data for similar products (prices, units sold, advertising, …)
- Predictive analytics: predict sales based on price
- Prescriptive analytics: find the best sets of pricing and advertising to maximize sales revenue

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Scope of Business Analytics

Analytics in Practice: ABC Entertainment

- ABCE owns numerous hotels and casinos
- Uses analytics to:
  - forecast demand for rooms
  - segment customers by gaming activities
- Uses prescriptive models to:
  - set room rates
  - allocate rooms
  - offer perks and rewards to customers

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Possible Strategies for Business Analytics

1. **Competing ON Analytics**
   - Analytics is THE key competitive advantage
   - Target Result – Sustainable competitive advantage
2. **Competing WITH Analytics**
   - Focus on one business process
   - Target result – Incremental profits
3. **Improving With Analytics**
   - Culture of analytics
   - Target result – Continuous improvement
4. **Revenue Through Analytics**
   - "Sell" data as a secondary product
   - Improved margins or market share
5. **Persevering Through Analytics**
   - Do what the competition does
   - The price of entry

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Step-wise Process of Business Analytics

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Data for Business Analytics

- VARIABLES
- DATA
  - collected facts and figures
- DATABASE
  - collection of computer files containing data
- INFORMATION
  - comes from analyzing data

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Variables for Business Analytics

Variables: Categorical (Qualitative); Quantitative

Dependent	**Independent**
Endogenous	**Exogenous**
Explained	**Explanatory**
Effect	**Cause**
Controlled	**Control**
Outcome	**Covariate**
Regressand	**Regressor**
Predictand	**Predictor**
Response	**Stimulus**

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Data Architecture

- Big data and small data
- Primary and secondary data
- Quantitative and qualitative data
- Experimental and non-experimental data
- Structured and unstructured data
- Internal and External data
- Traditional and “New” data
- “Free” and Purchased data
- Historical data

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Data Strategy



Data for Business Analytics

Examples of using DATA in business:

- Annual reports
- Accounting audits
- Financial profitability analysis
- Economic trends
- Marketing research
- Operations management performance
- Human resource measurements

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Visualization of data

- Example:
  1, 2, 50, 500 …, Kharagpur, gender, 10k3002, xy@gov.in,
  Anything else?

- Data vs. Information
  100.0, 0.0, 250.0, 150.0, 220.0, 300.0, 110.0

  Is there any information?

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Data for Business Analytics

- Metrics are used to quantify performance.
- Measures are numerical values of metrics.
- Discrete metrics involve counting
  - on time or not on time
  - number or proportion of on time deliveries
- Continuous metrics are measured on a continuum
  - delivery time
  - package weight
  - purchase price

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Example 1.1 A Sales Transaction Database File

	A	B	C	D	E	F	G	H
1	**Sales Transactions: July 14**							
2								
3	**Cust ID**	**Region**	**Payment**	**Transaction Code**	**Source**	**Amount**	**Product**	**Time Of Day**
4	10001	East	Paypal	93816545	Web	$20.19	DVD	22:19
5	10002	West	Credit	74083490	Web	$17.85	DVD	13:27
6	10003	North	Credit	64942368	Web	$23.98	DVD	14:27
7	10004	West	Paypal	70560957	Email	$23.51	Book	15:38
8	10005	South	Credit	35208817	Web	$15.33	Book	15:21
9	10006	West	Paypal	20978903	Email	$17.30	DVD	13:11
10	10007	East	Credit	80103311	Web	$177.72	Book	21:59
11	10008	West	Credit	14132683	Web	$21.76	Book	4:04
12	10009	West	Paypal	40128225	Web	$15.92	DVD	19:35
13	10010	South	Paypal	49073721	Web	$23.39	DVD	13:26

Records

Entities

Fields or Attributes

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Data for Business Analytics

Example 1.2: Classifying Data Elements in a Purchasing Database

	A	B	C	D	E	F	G	H	I	J
1	**Purchase Orders**									
2										
3	**Supplier**	**Order No**	**Item No.**	**Item Description**	**Item Cost**	**Quantity**	**Cost per order**	**A/P Terms (Months**	**Order Date**	**Arrival Date**
4	Spacetime Technologies	A0111	6489	O-Ring	$ 3.00	900	$ 2,700.00	25	10/10/11	10/18/11
5	Steelpin Inc.	A0115	5319	Shielded Cable/ft.	$ 1.10	17,500	$ 19,250.00	30	08/20/11	08/31/11
6	Steelpin Inc.	A0123	4312	Bolt-nut package	$ 3.75	4,250	$ 15,937.50	30	08/25/11	09/01/11
7	Steelpin Inc.	A0204	5319	Shielded Cable/ft.	$ 1.10	16,500	$ 18,150.00	30	09/15/11	10/05/11
8	Steelpin Inc.	A0205	5677	Side Panel	$195.00	120	$ 23,400.00	30	11/02/11	11/13/11
9	Steelpin Inc.	A0207	4312	Bolt-nut package	$ 3.75	4,200	$ 15,750.00	30	09/01/11	09/10/11
10	Alum Sheeting	A0223	4224	Bolt-nut package	$ 3.95	4,500	$ 17,775.00	30	10/15/11	10/20/11
11	Alum Sheeting	A0433	5417	Control Panel	$255.00	500	$ 127,500.00	30	10/20/11	10/27/11
12	Alum Sheeting	A0443	1243	Airframe fasteners	$ 4.25	10,000	$ 42,500.00	30	08/08/11	08/14/11
13	Alum Sheeting	A0446	5417	Control Panel	$255.00	406	$ 103,530.00	30	09/01/11	09/10/11
14	Spacetime Technologies	A0533	9752	Gasket	$ 4.05	1,500	$ 6,075.00	25	09/20/11	09/25/11
15	Spacetime Technologies	A0555	6489	O-Ring	$ 3.00	1,100	$ 3,300.00	25	10/05/11	10/10/11

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Example 1.3 (continued) :

Classifying Data Elements in a Purchasing Database

	A	B	C	D	E	F	G	H	I	J
1	**Purchase Orders**									
2										
3	**Supplier**	**Order No**	**Item No.**	**Item Description**	**Item Cost**	**Quantity**	**Cost per order**	**A/P Terms (Months**	**Order Date**	**Arrival Date**
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Figure 1.2

Categorical Categorical Categorical Categorical Ratio Ratio Ratio Ratio Interval Interval

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Data for Business Analytics

Types Data Based on Measurement Scale:

- Categorical (nominal) data
- Ordinal data
- Interval data
- Ratio data

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Data for Business Analytics

1. Ratio

For $X_1 > 0$ and $X_2 > 0$;

X_1/ X_2 , X_2/ X_1, X_1-X_2, X_2-X_1 , $X_1 >= X_2$, $X_2 >= X_1$ are meaningful

2. Interval: X_1-X_2, X_2-X_1 , $X_1 >= X_2$, $X_2 >= X_1$ are meaningful

3. Ordinal: $X_1 >= X_2$, $X_2 >= X_1$ are meaningful

4. Nominal/categorical

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Data for Business Analytics

Categorical (nominal) Data

- Data placed in categories according to a specified characteristic
- Categories bear no quantitative relationship to one another
- Examples:
  - customer's location (America, Europe, Asia)
  - customer's location (West Bengal, Karnataka, Punjab)
  - employee classification (manager, supervisor, associate)
  - employee classification (male, female)
  - employee classification (adult, child)

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Data for Business Analytics

Ordinal Data

- Data that is ranked or ordered according to some relationship with one another
- No fixed units of measurement
- Examples:
  - college football rankings (Ravenshaw, Christ, Xavier)
  - Management school rankings (VGSOM, IIMA, IIMB, IIMC, IIML, XLRI)
  - survey responses (poor, average, good, very good, excellent)

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Data for Business Analytics

Interval Data

- Ordinal data but with constant differences between observations
- No true zero point
- Ratios are not meaningful
- Examples:
  - temperature readings
  - SAT scores
  - CAT scores

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Data for Business Analytics

Ratio Data

- Continuous values and have a natural zero point
- Ratios are meaningful
- Examples:
  - monthly sales
  - delivery times
  - weekly sales
  - processing timings

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Data Structure

1. Time series data
2. Cross-sectional data
3. Pool data
4. Panel data.

- Examples of *time series data*

Series	*Frequency*
GNP or unemployment	monthly, or quarterly
government budget deficit	annually
money supply	weekly
value of a stock market index	as transactions occur

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Data Structure (Cont.)

Panel data can be defined as data that are collected as a cross section but then they are observed periodically.

For example, economic growth of each province in India from 1971-2009; or profit of companies listed in ISX observed from 1991-2009.

- Panel data is very useful for researchers who are interested in analyzing something that can not be done using time series/ cross section data only.

- E.g., we like to develop a model that can explain variations regional economic performance of provinces in India through their natural resources and productivity of their human resources. If we estimate the model using cross-section data that are observed only in one particular year, we can not say anything about variation of their growths over last ten years.

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Modelling as per the Data Structure

1. Model with cross section data
$Y_i = \alpha + \beta X_i + \varepsilon_i$; i = 1,2,….., N
N: number of cross section observations

2. Model with time series data
$Y_t = \alpha + \beta X_t + \varepsilon_t$;t =1,2,….,T
T: number of time series observations

3. Model with panel data
$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$; i =1,2,…..,N;
t =1,2,…..,T
N.T: number of panel data observations.

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Data Analytics Process

- Master data management
- Data visualization
- Data quality
- Data integration
- Data transformation
- Data governance

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Data Analysis Process Flows

- Reporting:
  scorecards, dashboards
- Descriptive:
  statistics, historical
- Predictive:
  forecasting, recommendations
- Prescriptive:
  simulation, what-if
- Machine learning
  pattern discovery

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Decision Models

Model:

- An abstraction or representation of a real system, idea, or object
- Captures the most important features
- Can be a written or verbal description, a visual display, a mathematical formula, or a spreadsheet representation

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Decision Models

Example 1.4 Three Forms of a Model

The sales of a new produce, such as a first-generation iPad or 3D television, often follow a common pattern.

- Sales might grow at an increasing rate over time as positive customer feedback spreads.

(See the *S*-shaped curve on the following slide.)

- A mathematical model of the S-curve can be identified;

for example, $S = ae^{be^{ct}}$

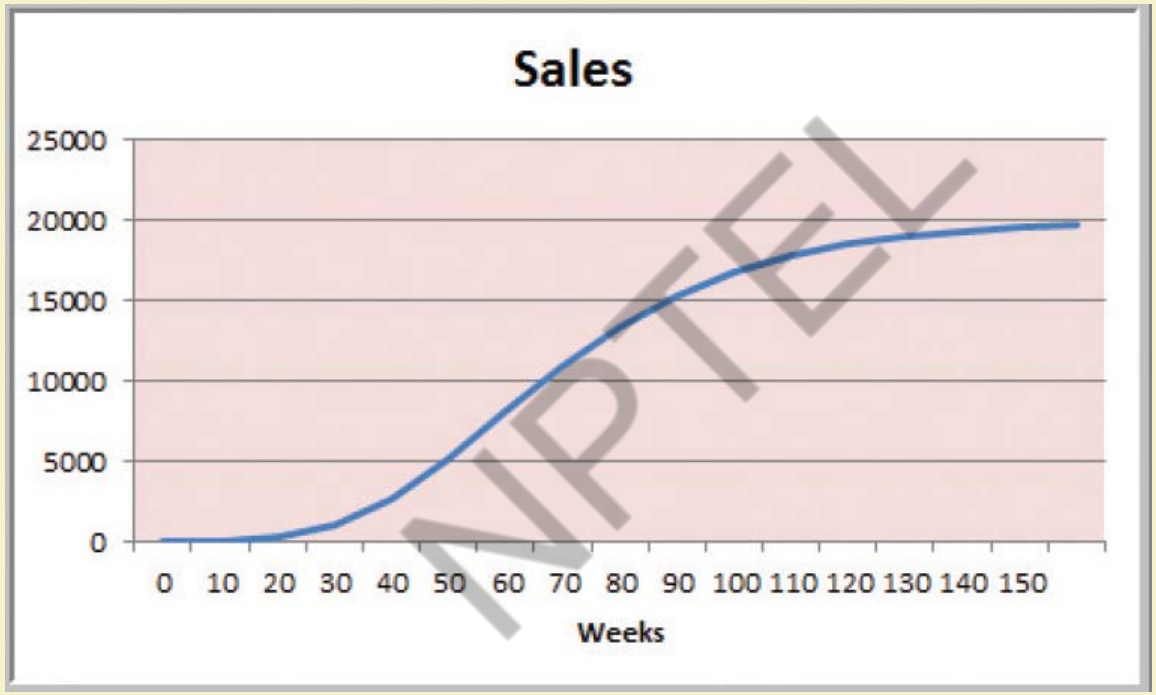
where *S* is

sales, *t* is time, *e* is the base of natural logarithms,

and *a*, *b* and *c* are constants.

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Decision Models



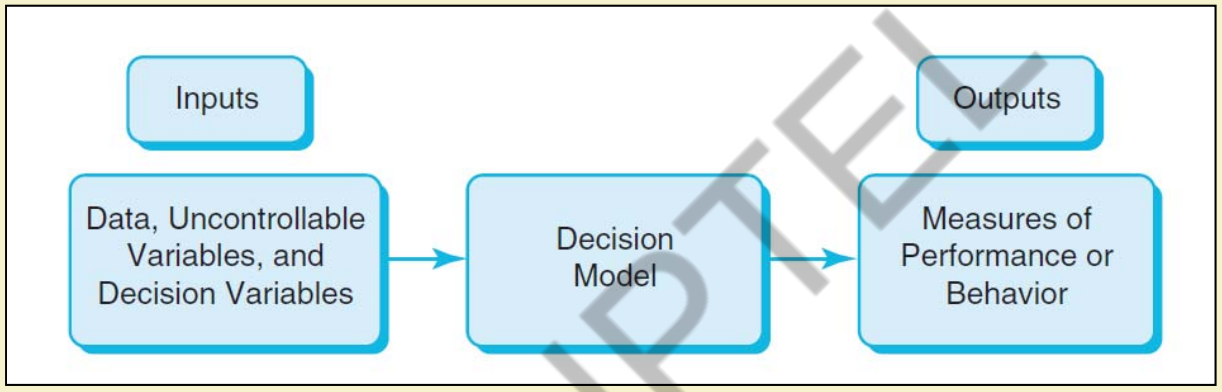
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Decision Models

- A decision model is a model used to understand, analyze, or facilitate decision making.
- Types of model input
  - data
  - uncontrollable variables
  - decision variables (controllable)
- Types of model output
  - performance measures
  - behavioral measures

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Decision Models



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Decision Models

Example 1.5 A Sales-Promotion Model

In the grocery industry, managers typically need to know how best to use pricing, coupons and advertising strategies to influence sales.

Using Business Analytics, a grocer can develop a model that predicts sales using price, coupons and advertising.

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Decision Models

Week	Price ($)	Coupon (0,1)	Advertising ($)	Store 1 Sales (Units)	Store 2 Sales (Units)	Store 3 Sales (Units)
1	$6.99	0	$0	501	510	481
2	$6.99	0	$150	772	748	775
3	$6,99	1	$0	554	528	506
4	$6.99	1	$150	838	785	834
5	$6.49	0	$0	521	519	500
6	$6.49	0	$150	723	790	723
7	$6.49	1	$0	510	556	520
8	$6.49	1	$150	818	773	800
9	$7.59	0	$0	479	491	486
10	$7.59	0	$150	825	822	757
11	$7.59	1	$0	533	513	540
12	$7.59	1	$150	839	791	832
13	$5.49	0	$0	484	480	508
14	$5.49	0	$150	686	683	708
15	$5.49	1	$0	543	531	530
16	$5.49	1	$150	767	743	779

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Sales = 500 – 0.05(price) + 30(coupons) +0.08(advertising) + 0.25(price)(advertising)

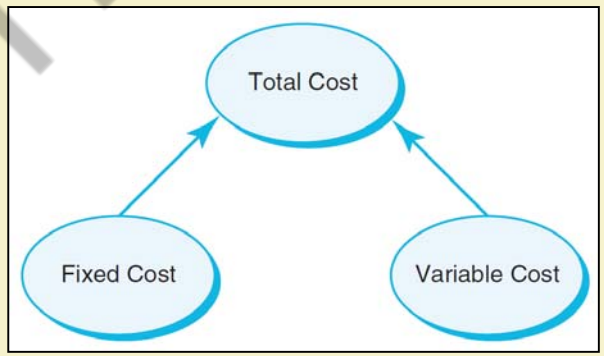
Decision Models

Descriptive Decision Models

- Simply tell "what is" and describe relationships
- Do not tell managers what to do

Influence Diagrams visually show how various model elements relate to one another.

Example 1.6 An Influence Diagram for Total Cost



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Decision Models

Example 1.7 A Mathematical Model for Total Cost

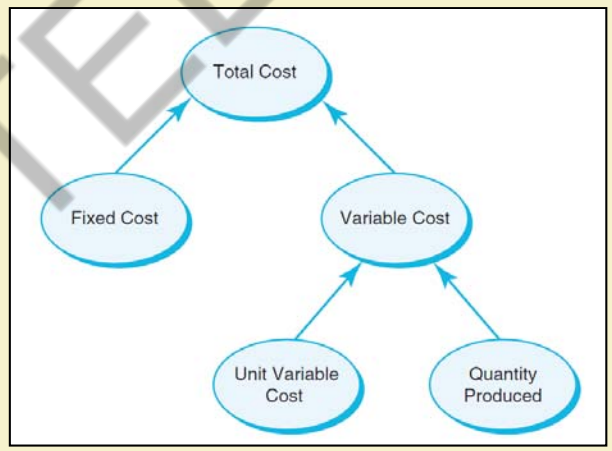
$TC = F + VQ$

TC is Total Cost

F is Fixed cost

V is Variable unit cost

Q is Quantity produced



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Decision Models

Example 1.8 A Break-even Decision Model

TC(manufacturing) = \$50,000 + \$125**Q*

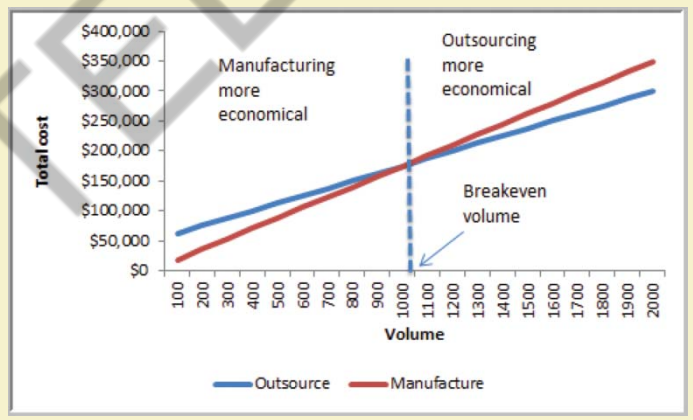
TC(outsourcing) = \$175**Q*

Breakeven Point:

Set *TC*(manufacturing)

= *TC*(outsourcing)

Solve for *Q* = 1000 units



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Decision Models

Example 1.9 A Linear Demand Prediction Model

As price increases, demand falls.



Figure 1.8

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Decision Models

Example 1.10 A Nonlinear Demand Prediction Model

Assumes price elasticity (constant ratio of % change in demand to % change in price)

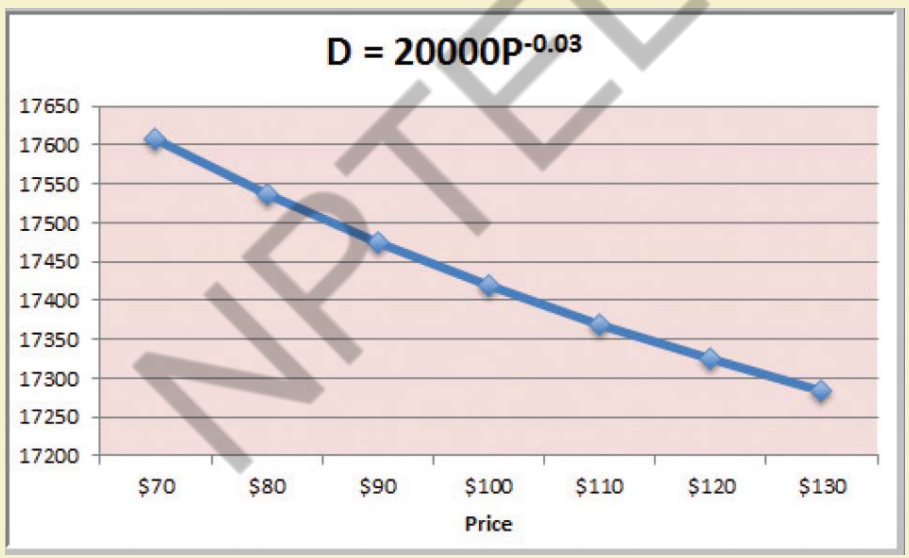


Figure 1.9

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Decision Models

- Predictive Decision Models often incorporate uncertainty to help managers analyze risk.
- Aim to predict what will happen in the future.
- Uncertainty is imperfect knowledge of what will happen in the future.
- Risk is associated with the consequences of what actually happens.

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Decision Models

Prescriptive Decision Models help decision makers identify the best solution.

- Optimization - finding values of decision variables that minimize (or maximize) something such as cost (or profit).
- Objective function - the equation that minimizes (or maximizes) the quantity of interest.
- Constraints - limitations or restrictions.
- Optimal solution - values of the decision variables at the minimum (or maximum) point.

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Decision Models

Example 1.11 A Pricing Model

- A firm wishes to determine the best pricing for one of its products in order to maximize revenue.
- Analysts determined the following model:

  Sales = -2.9485(price) + 3240.9

  Total revenue = (price)(sales)
- Identify the price that maximizes total revenue, subject to any constraints that might exist.

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Decision Models

- Deterministic prescriptive models have inputs that are known with certainty.
- Stochastic prescriptive models have one or more inputs that are not known with certainty.
- Algorithms are systematic procedures used to find optimal solutions to decision models.
- Search algorithms are used for complex problems to find a good solution without guaranteeing an optimal solution.

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Business Analytics for Management Decision

Introduction to Business Analytics

Rudra P. Pradhan
Vinod Gupta School of Management
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Decision Models

Prescriptive Decision Models help decision makers identify the best solution.

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Problem Solving and Decision Making

- BA represents only a portion of the overall problem solving and decision making process.
- Six steps in the problem solving process
  1. Recognizing the problem
  2. Defining the problem
  3. Structuring the problem
  4. Analyzing the problem
  5. Interpreting results and making a decision
  6. Implementing the solution

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Problem Solving and Decision Making

1. Recognizing the Problem

- Problems exist when there is a gap between what is happening and what we think should be happening.
- For example, costs are too high compared with competitors.

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Problem Solving and Decision Making

2. Defining the Problem

- Clearly defining the problem is not a trivial task.
- Complexity increases when the following occur:
  - large number of courses of action
  - several competing objectives
  - external groups are affected
  - problem owner and problem solver are not the same person
  - time constraints exist

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Problem Solving and Decision Making

3. Structuring the Problem

- Stating goals and objectives
- Characterizing the possible decisions
- Identifying any constraints or restrictions

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Problem Solving and Decision Making

4. Analyzing the Problem

- Identifying and applying appropriate Business Analytics techniques
- Typically involves experimentation, statistical analysis, or a solution process

Much of this course is devoted to learning BA techniques for use in Step 4.

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Problem Solving and Decision Making

5. Interpreting Results and Making a Decision

- Managers interpret the results from the analysis phase.
- Incorporate subjective judgment as needed.
- Understand limitations and model assumptions.
- Make a decision utilizing the above information.

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Problem Solving and Decision Making

6. Implementing the Solution

- Translate the results of the model back to the real world.
- Make the solution work in the organization by providing adequate training and resources.

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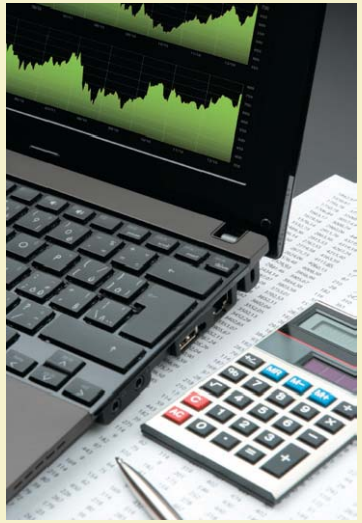
Problem Solving and Decision Making

Analytics in Practice: Developing Effective Analytical Tools at Hewlett-Packard

- Will analytics solve the problem?
- Can they leverage an existing solution?
- Is a decision model really needed?

Guidelines for successful implementation:

- Use prototyping.
- Build insight, not black boxes.
- Remove unneeded complexity.
- Partner with end users in discovery and design.
- Develop an analytic champion.



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Keywords

- Business analytics
- Business intelligence
- Quantitative data
- Categorical (nominal) data
- Constraint
- Continuous metric
- Data set
- Database
- Decision model
- Decision support systems
- Descriptive statistics
- Deterministic model
- Discrete metric
- Entities
- Fields (attributes)
- Influence diagram
- Interval data
- Management science (MS)

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Keywords (continued)

- Measure
- Measurement
- Metric
- Model
- Objective function
- Operations research (OR)
- Optimal solution
- Optimization
- Ordinal data
- Predictive analytics
- Prescriptive analytics
- Problem solving
- Ratio data
- Risk
- Search Algorithm
- Stochastic model
- Uncertainty

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Fun with Analytics

www.puzzlOR.com

- Maintained by an analytics manager at ARAMARK.
- Each month a new puzzle is posted.
- Many puzzles can be solved using techniques you will learn in this course.
- The puzzles are fun challenges.
- A good one to start with is SurvivOR (June 2010).
- Have fun!

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Case Study: Performance Lawn Equipment (PLE)

- PLE is headquartered in St. Louis and produces lawnmowers as well as a recently added a medium size diesel power lawn tractor.
- The Excel workbook *Performance Lawn Equipment* contains performance data that is used by managers to evaluate business performance.
- As chief analyst to the productions and operations manager, you need to review all of the Excel worksheets and prepare a report summarizing the sources of the data, the types of data measures used, and the characteristics of the metrics used.

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Books to read

- Business Analytics by J R Evans
- Business Analytics for Managers by H. N. Laursen

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Thank You!!

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