

BUSINESS ANALYTICS

MIS171

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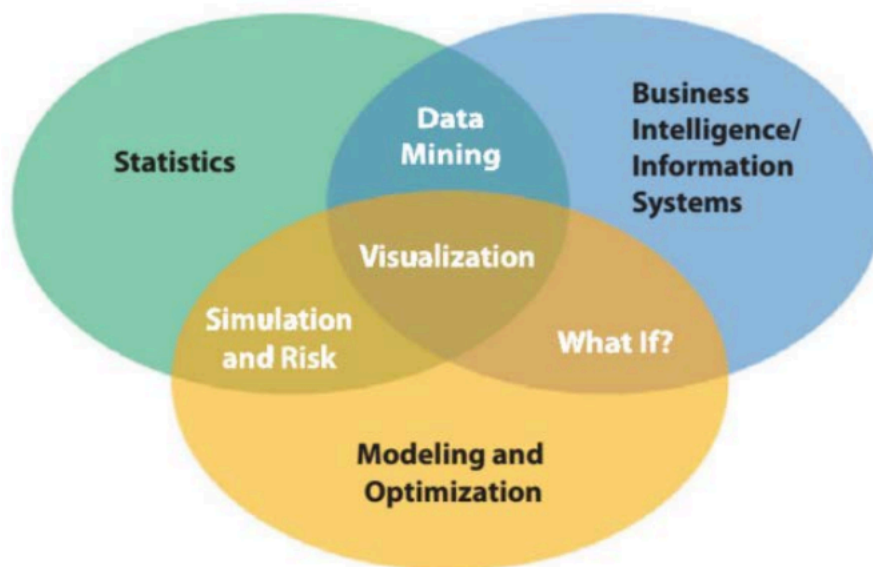
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TOPIC 1- INTRODUCTION TO BUSINESS ANALYTICS

What is Business Analytics?

Business Analytics is "a process of transforming data into actions through analysis and insight in the context of organisational decision making and problem solving" (Liberatore & Luo 2010)

Analytics is the use of data, information technology, statistical analysis and mathematical or computer-based models to help decision makers gain improved insight about their business operations and make better, fact-based decisions (Evans 2017).



Evans, James R. *Business Analytics, Global Edition, 2nd Edition*

What is the importance of analytics?

For too long, important decisions have not been based on data, but on the judgement and intuition of the decision maker (Accenture 2008).

Data, facts and analysis are powerful aids to decision making and that the decisions made on them are better than those made through intuition or gut instinct (Davenport, Harris & Morrison 2010).

What makes decision making complicated today is the overwhelming amount of available data and information (Evans 2013).

Analytics is a powerful business tool that enables firms to leverage their data in key business decisions.

Companies are taking advantage of analytics to equip every decision maker with the ability to make the right decision, every time.

The key is becoming more analytical and fact based in your decision making and to use the appropriate level of analysis for the decision at hand.

There is a strong relationship of BA with

- Profitability of businesses
- Revenue of businesses
- Shareholder return

BA enhances understanding of data and informative reports

BA is vital for businesses to remain competitive

Business analytics applications

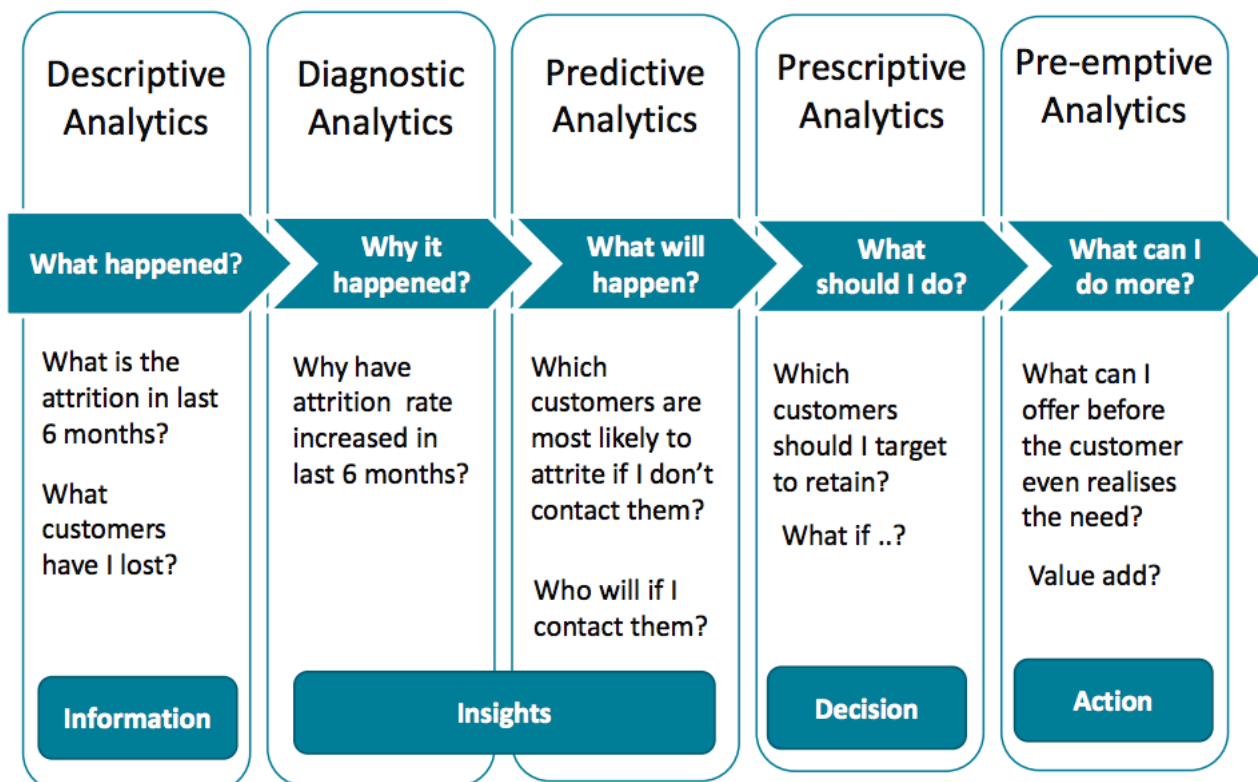
- New customer acquisition/ Customer loyalty/ Cross Sell/ Up Sell
- Pricing decisions/ Financial forecasting/ Insurance rate settings
- Supply optimisation/ Staff optimisation
- Product placement/ Churn
- Fraud detection
- Performance and injury management of sport

Scope of business analytics

BA begins with the collection, organisation and manipulation of data and is supported by three major components:

- Descriptive Analytics (Diagnostic)
- Predictive Analytics
- Prescriptive Analytics (Pre-emptive)

Although the tools used in descriptive, productive and prescriptive analytics are different, many applications involve all three.



Descriptive analytics

Uses data to understand past and present performance and make informed decisions.

Most commonly used and well understood type of analytics.

Uses fundamental tools and methods of data analysis focusing on:

- Descriptive statistical measures and Data visualisation
- Probability distributions/ Confidence Interval
- Hypothesis test

Predictive analytics

Analyses past performance in an effort to predict the future by examining historical data, detecting patterns or relationships in these data, and then extrapolating these relationships forward in time.

Techniques include:

- Regression and Forecasting
- Data Mining and Machine Learning
- Inferential statistics

Prescriptive analytics

Uses optimisation to identify the best alternative to minimise or maximise some objective

Techniques include the use of mathematical models:

- Decision analysis
- Optimisation
- Stimulation

Example- retail markdown

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 set of pricing decisions to maximise sales revenue

Role of Statistics in Analytics

Statistics relates to the collection, analysis, interpretation, and presentation of data.

As mentioned earlier, statistical methods underpin many of the techniques used in business analytics. Statistical methods can be used to:

- Explore and summarise data
- Draw inferences about an entire population from a sample
- Make predictions or forecasts

Statistics is also the study of variation in data

Data in business

Data is used in virtually every major function of business:

- Annual reports (communicate profitability, market share...)
- Accounting audits
- Financial profitability analysis

- Economic trends
- Marketing research
- Operations management performance
- Human resource measurements

Data sources

Primary sources: internal company records and business transactions, automated data-capturing equipment, customer market surveys

Secondary sources: government and commercial data sources, custom research providers, online research

Perhaps the most important source of data today, especially from a marketers perspective, is obtained electronically from the Web

Web data are now being enhanced with social media data from Facebook, cell phones and even Internet-connected gaming devices

Data deluge

Most companies today have massive amounts of data at their disposal (Big Data)

The data deluge is the result of the prevalence of:

- Automatic data collection
- Electronic instrumentation
- Online transactional processing

There is a growing recognition of the untapped value in these databases.

This recognition is driving the development of business analytics.

What is Big Data?

Volume- amount of data we produce (2.5 Exabyte a day and doubling every 40 months)

Variety- Big data takes the form of messages, updates and images posted to social networks, readings from sensors, GPS signals from cell phones and more.

Velocity- means both how fast data is being produced and how fast the data must be processed to meet the demand.

Structured and Unstructured Data

		Data Type	
		Structured	Unstructured
Data Source	External	Public Data Postcode data House Hold data Credit Scoring Market Research data	Social Media (Twitter, Facebook, Instagram) Blogs External sensor data
	Internal	CRM data Sales data Transaction data Invoice data Usage data Campaign data	Customer contact data (mail, email, text message, call centre, shop, website) Sensor data Mobile data



Data reliability and validity

Data used in BA needs to be reliable and valid.

Care must be taken when working with data, and every effort should be made to ensure that data are sufficiently accurate.

Poor data can result in poor decisions.

Data analysis can be thought of as 80% data preparation and 20% analysing.

Data and Datasets

Data are facts and figures collected

Information comes from analysing data

The data collected in a particular study are referred to as a **Dataset**

Dataset: entities, variables, and records

The people, places or things for which we store and maintain information are called **entities**

A **variable** (or attribute) is a characteristic of interest for the entities.

The set of measurements collected for a particular entity is called a **record** (or observation).

Example: Sales Transactions Data Set

	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

Entities (Cust ID, Region, Payment, Transaction Code, Source, Amount, Product, Time Of Day)

Variables or Attributes (Cust ID, Region, Payment, Transaction Code, Source, Amount, Product, Time Of Day)

Records (Each row of data)