Chapter 1

The Where, Why, and How of Data Collection

TENTH EDITION

BUSINESS STATISTICS

A DECISION-MAKING APPROACH

DAVID F. GROEBNER

PATRICK W. SHANNON

PHILLIP C. FRY

Pearson
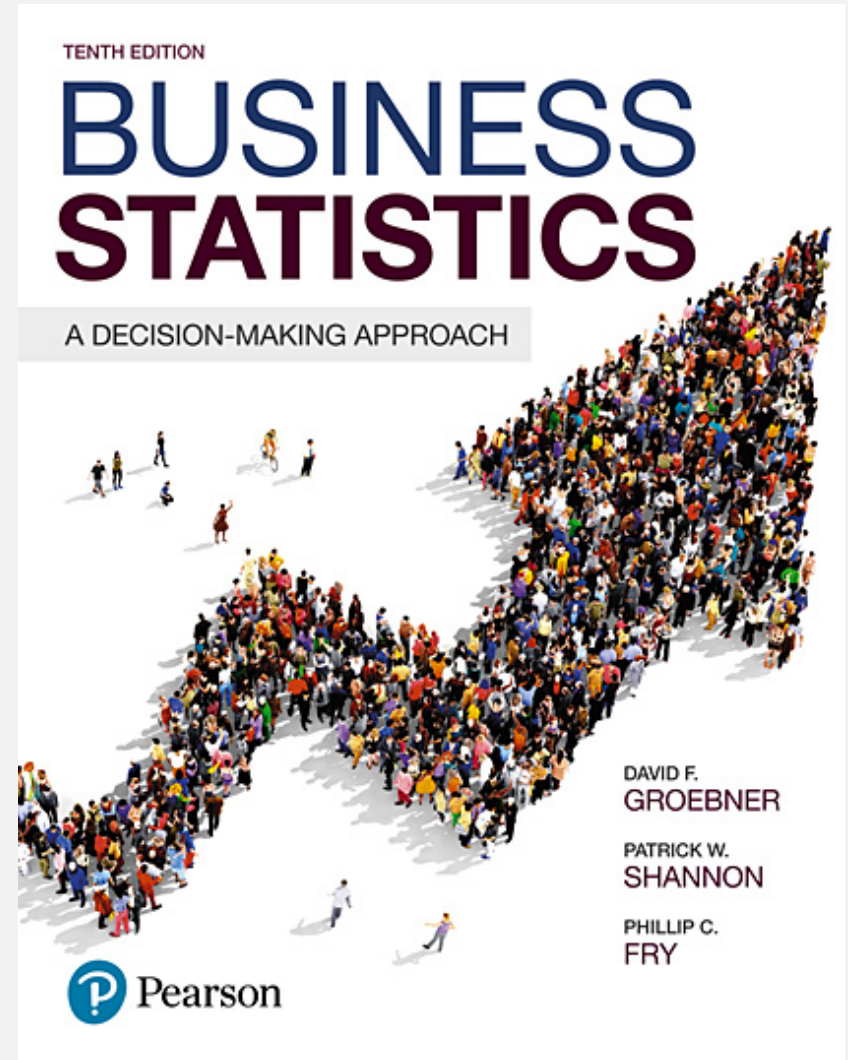
Learning Outcomes

Outcome 1. Know the key data collection methods.

Outcome 2. Know the difference between a population and a sample.

Outcome 3. Understand the similarities and differences between different sampling methods.

Outcome 4. Understand how to categorize data by type and level of measurement.

بسم الله الرحمن الرحيم

Introduction

يستطيع صنّاع القرار أخذ قرارات صحيحة عندما يتم تزويدهم بمعلومات كافية وصحيحة
لذا فإن القواعد الاولية لعلم الاحصاء هى امداد صنّاع القرار بطرق الحصول على هذه
المعلومات التى تساعدهم فى اتخاذ القرار

Statistics:- is the science of collecting, organizing, presenting, analyzing and interpreting numerical data

يجمع — تنظيم — علمى — يعرض — تحليل — صحيح

البيانات العددية

• Maths transform data into useful information to make better decision

بيانات — معلومة

Data

Visualize the data; analyze with statistical models

Control sources of variation, detect outliers

Experiments — تجربة على ادوية

Design experiments to answer research questions

Knowledge — يؤدى الى المعرفة

Interpret practical and statistical significance of results

Understanding — نساعد على الفهم

Make scientifically sound decisions and communicate them — اجل التعمق واوجه للقرار السليم

Solve Problems and Make Decisions — التطعيم الاجبارى

احلل — من دول على مستوى العالم — انه بسبب هذه البيانات ادت الى ارتفاع حالات اليومية

خطر — الفايروس — سريع الانتشار

لوكداون Lockdown — امنع

Business
Economics, Engineering, Marketing, Computer Science

Physical Sciences
Astronomy, Chemistry, Physics

Health & Medicine
Genetics, Clinical Trials, Epidemiology, Pharmacology

Areas where STATISTICS are used

Environment
Agriculture, Ecology, Forestry, Animal Populations

Government
Census, Law, National Defense

1.1 What is Business Statistics?

معرفة مجموعة الإجراءات والتقنيات

Business statistics:- is a collection of procedures and techniques that are used to convert data into meaningful information in a business environment

بيانات **Data** → **Statistical Procedures Descriptive Inferential** → **Information** معلومات ذات معنى

اجراءات
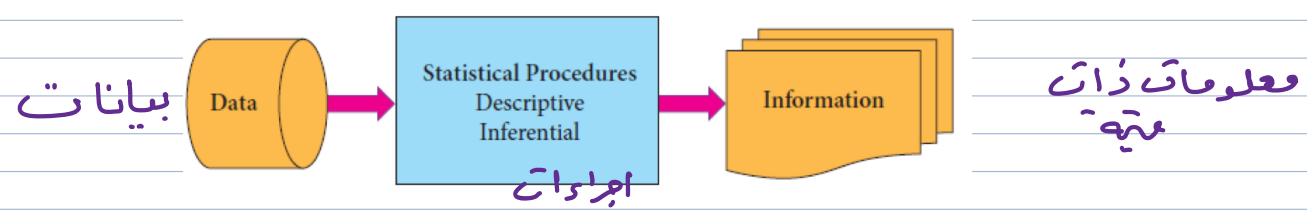
Variables

	A	B	C	D	E	F	G
1	Book	Units Sold	Pages	Competing Books	Advertising Budget	Age of Author	Market Classification
2	1	15000	176	5	25000	49	Social Sciences
3	2	140000	296	10	83000	57	Business
4	3	75000	483	7	40000	29	Business
5	4	100000	811	14	29000	37	Social Sciences
6	5	26000	302	9	52000	35	Business
7	6	33000	411	15	33000	43	Business
8	7	59000	333	7	19000	51	Social Sciences
9	8	103000	602	4	37000	62	Business
10	9	88000	504	12	51000	33	Social Sciences
11	10	10000	204	3	30000	50	Business
12	11	9000	376	4	19000	26	Business
13	12	77000	600	7	41000	40	Business
14	13	59000	400	3	26000	44	Social Sciences
15	14	183000	597	8	51000	59	Business
16	15	16000	126	1	27000	38	Social Sciences

Observations

There is two main branches (types) of statistics

Descriptive statistics

الاحصاءالوصفية

is concerned with the techniques that are used to summarize and describe the data. It can be graphical (graphs and diagrams) or computational analysis (tables, presentations
or summary measures or numerical measures

(Mean = $\dfrac{\text{Sum of all data values}}{\text{Number of data values}}$

)

Inferential statistics

Stat 2//

احصاءاستنتاجية

It's the part of statistics concerned with drawing of
conclusion (inferences) from the data
Take a sample → observe it-   draw conclusion
It includes [estimation, hypothesis test, forecasting,
quality control]

Estimation

متوسط دخل جميع العائلات يتراوح منه

Ex:- Estimate the average income of families in Dammam based on average income of a sample of families

Ex:- Use evidence to test the claim that the average family income exceeds $45,000 /year

Types of statistics

Descriptive statistics
احصاء وصفية
(past)

التعريف (2)
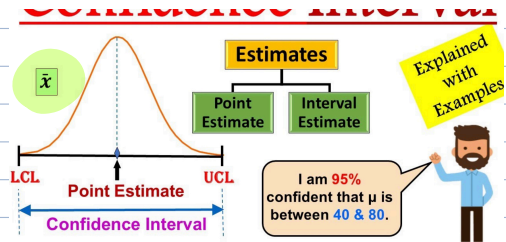
Procedures and techniques designed to describe data

Graphs   ch 2

Food Store Sales

✓
✓

Table   ch2

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
English	431	59.83	101.95	82.7265	6.82982
Reading	435	55.11	103.62	82.0394	7.63745
Math	435	35.32	93.78	65.4512	8.29165
Writing	435	64.06	93.01	79.5392	5.50151
Valid N (listwise)	431				

✓

Numerical Measure

Descriptive statistics

Mean
Median
Mode

average
S.D
Variance

ch3

Inferential statistics
احصاء استنتاجية
(future)

Tools and techniques that help decision makers to draw inferences from a set of data

Estimation

Estimates

Point Estimate   Interval Estimate

$\bar{x}$

LCL   UCL
Point Estimate
Confidence Interval

Explained with Examples

I am **95%** confident that μ is between **40 & 80**.

Hypothesis test

PROBLEM

Hypotheses

H_0 VS H_1

forecasting
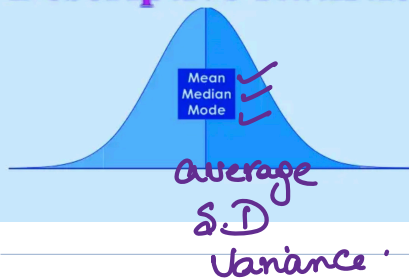
Descriptive /Inferential statistics

a) Karan hotel manager is getting ready to make a presentation that she hopes will justify adding additional staff. She has constructed charts and graph

Descriptive

b) Drinking coffee can raise blood pressure level by 7%

→ *future   Inferential*

c) The price of oil reached the minimum since 2015

حيث لا نفعل   *Descriptive*

d) The average age of students in Maths class is 21 years

Descriptive

e) The passing rate in statistic 381 is 96%

$\frac{عدد الناجحين}{العدد الكلي} = 96\%$ → حيث لا نفعل *Descriptive.*

f) The temperature in KSA reached the minimum since the beginning of 2018

وصلت   حيث لا نفعل *Descriptive*

g) The manager of Anna fabric shop has collected data for lo years on the number of each type of dress fabric that has been sold at the store. She is interested in making a presentation that will illustrate these data

Descriptive.

e) A medicine company claims that a new drug will help curing lungs cancer. The company provided data as an evidence for their claim

future

Inferential

f) If a researcher claims that "sun affects the skin "and he did an experiment to prove it. This is an example

H-T

Inferential

g) the average of math test score in a certain college

Descriptive.

H) Forecast the profit of a certain computer store next year

توقع

Inferential

a. The average height of students in a class of Math 117 is 5.2. *Descriptive .*
b. From the past results, it is predicted that 40% of the Computer science students will attend the workshop. توقع *Inferential.*
c. The collection and summarization of physical characteristics (i.e. Gender, Level of education, skills etc.) of the students in a college. *Descriptive .*

Data:-
are facts and figures from which conclusion can be drawn

بيانات   حقائق   ارقام   بيانات

Sources of data

مصادر البيانات

Primary data

بيانات أولية

(not available)
must be collected by
observations, experiments
surveys or interviews
Ex:- An administrator
gathered a data from
a survey of 100 teacher
to determine their level
of satisfication with
School policies

Secondary data

بيانات ثانوية

(available)
Data which are easy
available and inexpensive
to obtain but may not
satisfy the needs of study
Ex:- data obtained by
newspapers, business journal
internet, reports companies]
It can be printed or
electronic

data → Information
✓✓✓
70% Not satisfied
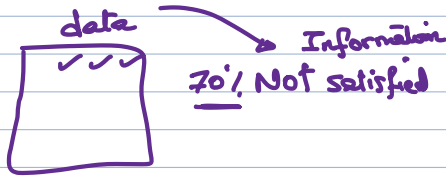
Primary - Secondary

① A Politican gathered data published in newspapers to determine the highest number of voters *Secondary*

② A politic an gathered data from a survey of 100 youths to determine if they are in favor with the new government rule *Primary*

③ Data obtained from internet or reports *Secondary*

④ A doctor get data that eating salt can raise blood pressure by 10% *primary*

⑤ number of students in the class is 30 students *Secondary*

⑥ A school conducted a survey of 70 of its employees to determine their level of satisfaction on the school leave policies the data collected from this survey is an example of *primary*

Data   Information ✓

2 branches of statistics ⟨ descriptive ←

                          Inferential
                          (will)
                          Experiment
                   Conclusion

Sources of data ⟨ Primary ←
                  Secondary ← ✓