Mohamed Khider University, Biskra, Faculty of Architecture, Civil Engineering, Hydraulics
Department of Architecture

Master 2 in **Construction Projects Management**
Course: **Data Analysis**

05 04 03 02 01 About course

CHAPTER 01

Introduction to Data Analysis

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Chapter Objectives

At the end of the course, the learner will be able to:

- Recognize the significance of data analysis and its importance
- Make a distinction between quantitative and qualitative data
- Learn about the steps involved in data analysis.
- Recognize several examples of data analysis in construction projects management domain.



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Chapter Contents

- **1.1 What is data and data analysis?**
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- **1.4 Overview of Data Analysis Process**
- **1.5 Application of Data Analysis in Construction Project Management Research**







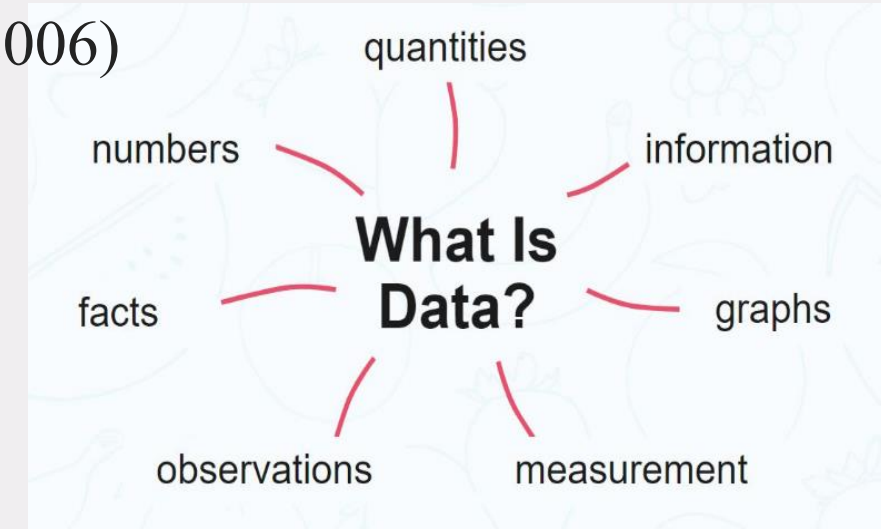
About course

1.What is data and data analysis?

DATA refers to **factual information** that needs to be recorded and analyzed in a form which can be assessed to make a determination or decision about a specific action.

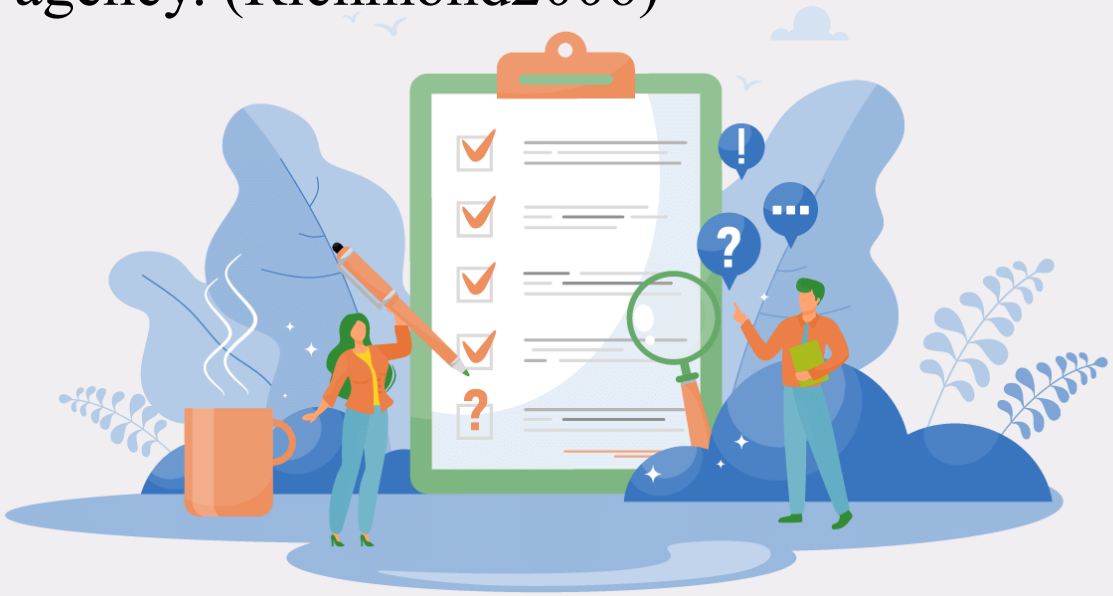
It consists of facts, numbers, text, letters, symbols, images, sounds, and measurements.

Data is gathered from a variety of sources, such as scientific research, government records, commercial transactions, social media, ect. (Richmond, 2006)



DATA ANALYSIS a range of specific **procedures**, **specialized techniques and methods** that convert the collected data to meaningful information in order to draw conclusion about that information, thus supporting the mechanism of decision-making process. (Bhatia, 2017)

In other words, Data analysis includes ways of working with information (data) to support the work, goals and plans of your program or agency. (Richmond2006)



2. Importance of Data Analysis

Data analysis is the most crucial part of any research. It allows researchers to understand the information gathered, test hypotheses, and draw conclusions. « **data analysis is the crucial** part of research which makes the result of the study more effective ». (Dawit, 2020, p25).



03 Types of Data

Data are organized into two broad categories:

01

Qualitative Data



02

Quantitative Data



03 Types of Data

01 Qualitative Data

Qualitative data are mostly **non-numerical** and usually descriptive or nominal in nature. This means the data collected are in the form of words and sentences. Such data captures feelings, emotions, or subjective perceptions of something.



03 Types of Data

01 Qualitative Data

Examples :

- The supervisor observed that workers were '**well-coordinated**' during the concrete pour.
- Workers reported that the new safety protocols were '**easy to follow**' but '**time-consuming**.'
- The project team identified potential weather disruptions as a '**significant risk**' to the schedule



03 Types of Data

02 Quantitative Data

Quantitative data refers to **numerical** data that can be measured and quantified. It is data that represents quantities and is typically used for statistical analysis, often collected through surveys, measurements, and experiments.



03 Types of Data

02 Quantitative Data

Examples :

- The project is scheduled to be completed in **12 months.**
- Material costs for the foundation amount to **200,000 DA**.
- There are **150 workers** on-site daily
- Each floor of the building will take **30 days** to construct.



03 Types of Data

What is the difference between quantitative and qualitative data ?

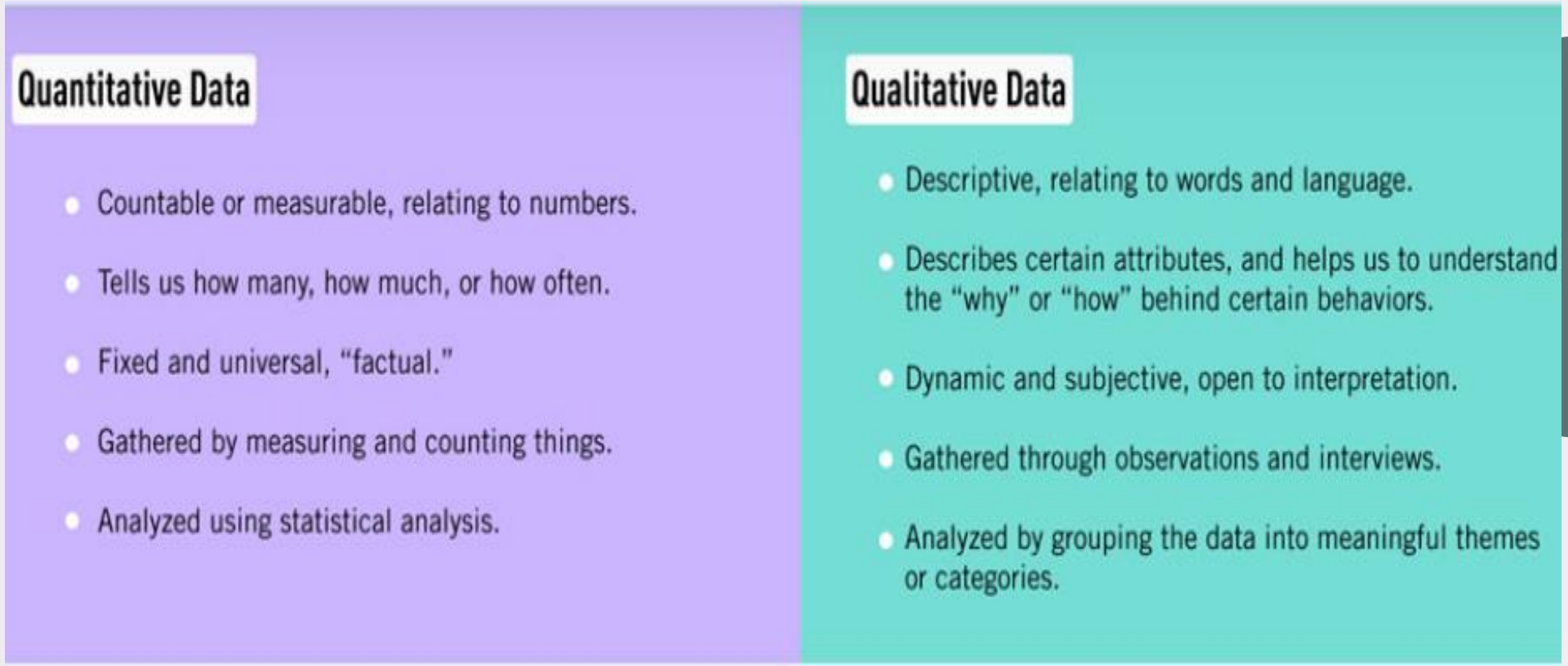


Figure 01 : the difference between quantitative and qualitative data. source : https://careerfoundry.com/en/blog/data-analytics/difference-between-quantitative-and-qualitative-data/

4. Overview of Data Analysis Process

The data analysis process is a systematic approach to collecting, cleaning, interpreting, and presenting data to extract meaningful insights and support decision-making. Here's an overview of the key steps involved in this process:



Figure 02 : steps of data analysis process

4. Overview of Data Analysis Process

01 Define the objectives/research problem

First, we need to clear about why we need data analysis and what we will do with it. Clearly **outline the goals of the analysis**. This step helps determine **what questions need to be answered**, **what decisions need to be supported**, or **what problems need to be solved.**

Key Questions:

- What are the objectives of this analysis?
- What outcomes are expected?

Example: In a construction project, the objective might be to identify causes of cost overruns.

4. Overview of Data Analysis Process

02 Data Collection

Data collection is a process of collecting information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcome



Example: Collect daily progress reports, budget records, and weather data for a construction project.

4. Overview of Data Analysis Process

03 Data Cleaning and Preparation

After you collect the data, you must enter it into a computer program such as SAS, SPSS, or Excel. During this process, whether it is done by hand or a computer scanner does it, there will be errors.

No matter how carefully the data has been entered, errors are inevitable. This could mean incorrect coding, incorrect reading or written codes, incorrect sensing of blackened marks, missing data, and so on. **Data cleaning is the process of detecting and correcting these coding errors.**

Example: Remove duplicate entries from progress logs and standardize date formats.

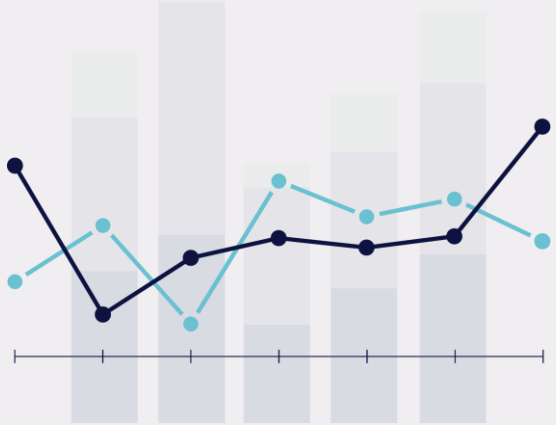
4. Overview of Data Analysis Process

04 Data Exploration and Visualization

Explore the data to understand its structure, patterns, and key characteristics. **Visualization tools**, such as **graphs, charts, or dashboards**, are often used to make sense of the data.

Example: Create a bar chart to visualize monthly expenses and identify trends in cost overruns.







4. Overview of Data Analysis Process

05 Data Analysis

Apply **analytical techniques** to interpret the data and extract meaningful insights. The specific methods used depend on the type of data (qualitative vs. quantitative) and the objectives of the analysis.



4. Overview of Data Analysis Process

06 Interpretation of Results

Interpret the findings from the data analysis in the context of the objectives. This step involves making sense of the results and determining what actions or decisions can be made based on the insights gained.

Questions:

- What do the results mean?
- How do the findings align with the project's goals or hypotheses?

Example: Conclude that delays caused by subcontractor inefficiencies are responsible for 20% of project schedule overruns.

4. Overview of Data Analysis Process

07 Reporting and Communication

Present the results of the analysis in a clear and actionable format. This could include written reports, visual dashboards, or presentations tailored to different stakeholders.

Key Elements:

- Summary of key findings.
- Visual representations (graphs, charts).
- Recommendations based on the analysis.

Example: Prepare a report with charts showing the main causes of cost and schedule delays and suggest mitigation strategies.

5. Application of Data Analysis in Construction Project Management Research (Example)

A simpler example of data analysis in a construction project context, focusing on understanding the impact of weather delays on project completion times.

1-Research Objective To determine how weather delays impact the total duration of construction projects.

2- Data Collection

Project ID	Weather Delays (days)	Total Duration (days)
001	3	150
002	0	120
003	5	180
004	2	140
005	7	200

5. Application of Data Analysis in Construction Project Management Research (Example)

3- Data Cleaning and Preparation ➡ Ensure all data entries are correct and consistent. In this case, verify that weather delays and total duration are recorded in days.

4- Data Exploration and Visualization

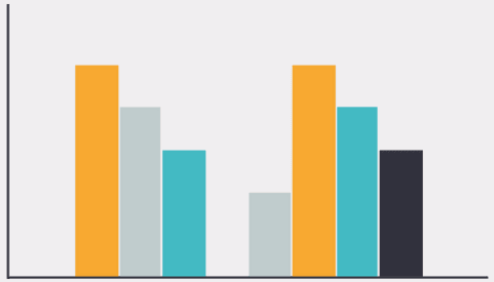
1-To visualize the relationship between weather delays and total project duration.



- **X-axis**: Weather Delays (days)
- **Y-axis**: Total Duration (days)
- **Plot**: Each project is represented as a point. The scatter plot will show if there's a visible trend or pattern.

2- To compare the total duration of projects with different weather delays

- **X-axis**: Project ID
- **Y-axis**: Total Duration (days)
- **Bars**: Each bar represents the total duration for a specific project, which can be compared visually to the weather delays.



5. Application of Data Analysis in Construction Project Management Research (Example)

5- Data Analysis

Using analytical techniques (ex: descriptive analysis, exploratory analysis,….)

- to determine if there is a relationship between weather delays and total project duration

The high positive correlation suggests that as weather delays increase, the total project duration also tends to increase.



5. Application of Data Analysis in Construction Project Management Research (Example)

6- Results Interpretation

- **Findings**:
  - There is a strong positive correlation between weather delays and total project duration.
  - Projects with more weather delays generally have longer total durations.
- **Recommendations**:
  - **Improve Planning**: Factor in potential weather delays during the planning phase to create more realistic project timelines.
  - **Implement Mitigation Strategies**: Develop strategies to minimize the impact of weather on construction activities, such as scheduling critical tasks during favorable weather periods.

5. Application of Data Analysis in Construction Project Management Research (Example)

7- Reporting and Communication

- **Research Report**: Create a brief report summarizing the findings. Include the average weather delays, total durations, and correlation results. Use a scatter plot to visualize the relationship between weather delays and total duration.

- **Presentation**: Present the findings in a simple slide or dashboard, highlighting the key points and recommendations.

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Webography

- **source : https://careerfoundry.com/en/blog/data-analytics/difference-between-quantitative-and-qualitative-data/**


Thank You!