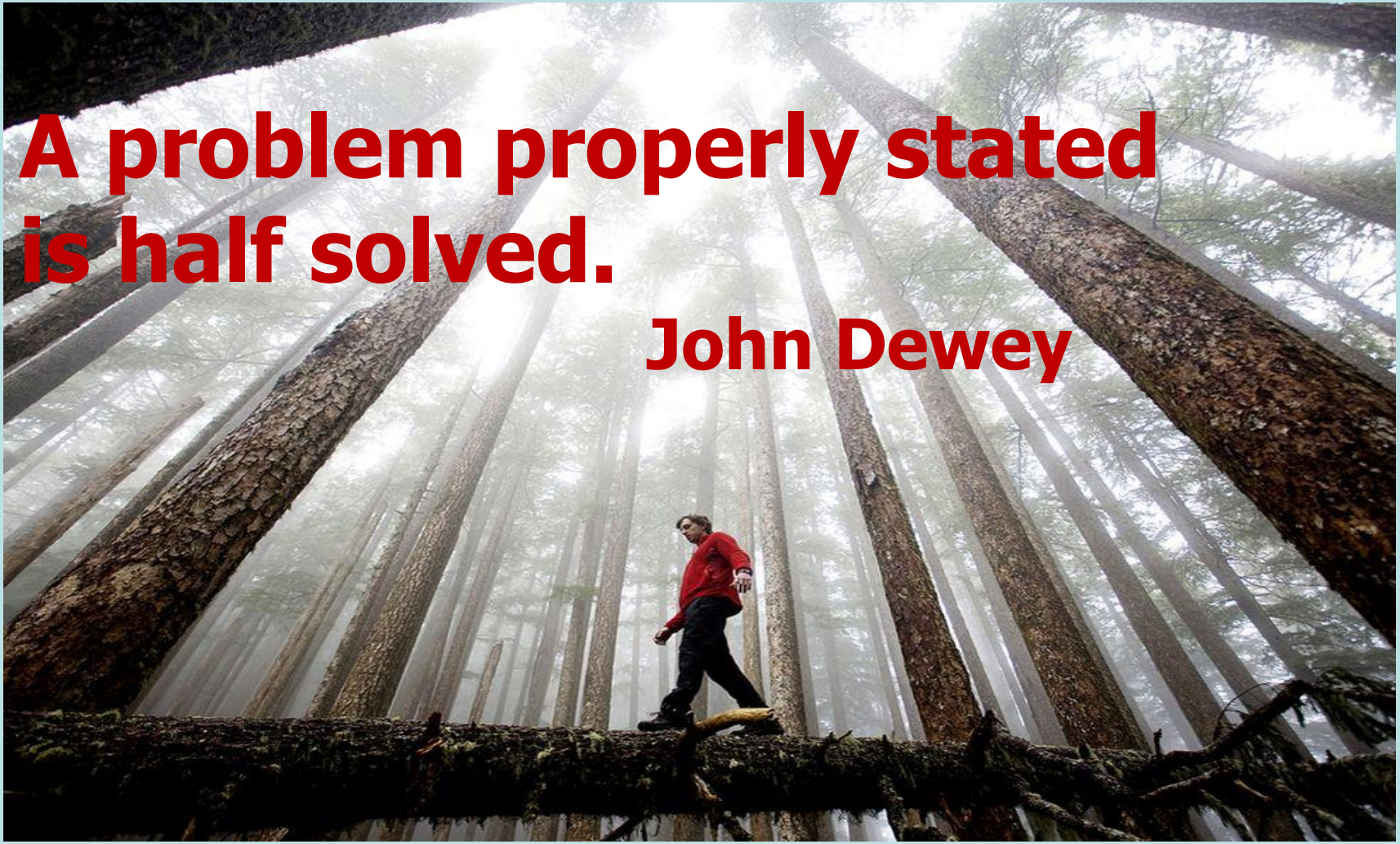
1. DEFINING A RESEARCH PROBLEM



2.1. WHAT IS A RESEARCH PROBLEM ?

Defining a research problem is the fuel that drives the scientific process, and is the foundation of any research method and experimental design.

Research Problem: A situation or circumstance that requires a solution to be described, explained, or predicted.

The components of a research problem can be :

- There must be an individual or a group which has some difficulty or the problem.
- There must be some objective(s) to be attained at.

2.1. WHAT IS A RESEARCH PROBLEM ?

- There must be alternative means for obtaining the objective(s) one wishes to attain.
- There must remain some doubt in the mind of a researcher with regard to the selection of alternatives. This means that research must answer the question concerning the relative efficiency of the possible alternatives.
- There must be some environment(s) to which the difficulty pertains.

2.2. SELECTING THE PROBLEM

- The research problem undertaken for study must be carefully selected.
- If there is a **knowledge gap** in an area that need to be investigated, the **research problem identifies this gap.**
- Most researchers **find selecting a research problem so difficult**
- This **difficulty arise** not because there is a limited range of reachable problems in sciences but **the inability to locate the socially relevant topic without duplicating earlier studies.**

CRITERIA FOR SELECTING A RESEARCH PROBLEM

Details of the aspect of problem selection criteria is listed below :

- **The problem must be significant in the sense that its solution should make a contribution to the body of organized knowledge in the field represented**. The researcher should demonstrate that the selected topic is likely to **add information to existing knowledge by making more reliable knowledge available.** Furthermore, the problem should have either **theoretical or practical implication** or both.

CRITERIA FOR SELECTING A RESEARCH PROBLEM

- **The problem should be a researchable one**. There are many problems that related to questions that can only be subjected to **philosophic rather than scientific investigation**. Researchable problem must be concerned with the relationships between two or more variable that can be defined and measured or explained.
- **The problem should be one that will lead to new problems and to further research.** This criterion implies that in so far as researchers often relate their problems to existing knowledge in the field involved, **attention should be given to the selection of a problem whose solution is likely to raise a number of other questions for further research.**

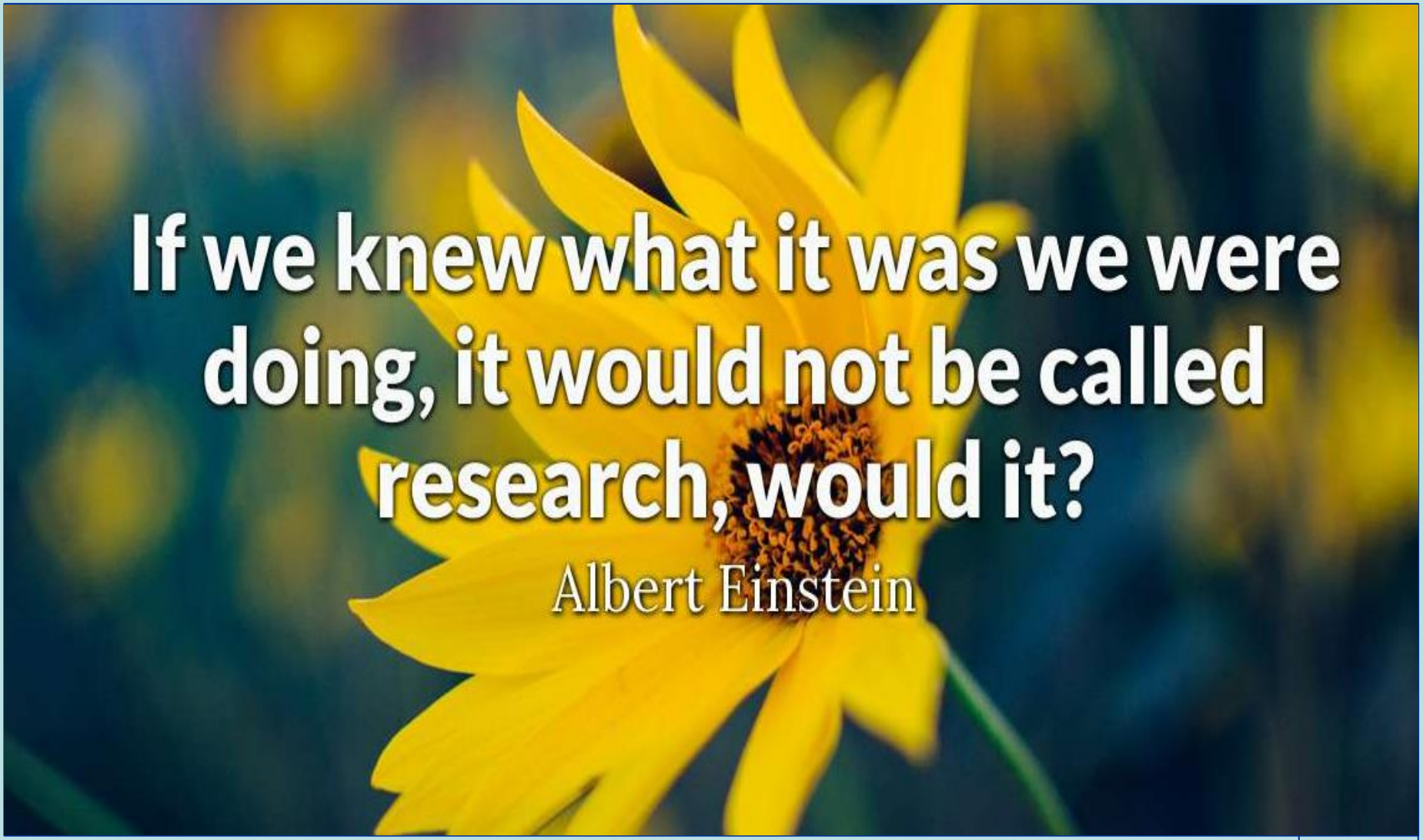
CRITERIA FOR SELECTING A RESEARCH PROBLEM

- **The problem must be suitable for the researcher** in several respects :
  - The problem should be one which ***arouses the researcher's genuine interest***. The research must be ***personally important to the researcher*** and ***enhancement his competence***
  - The problem should be in an area about which one has **both knowledge and experience**. The researcher must have a clear understanding of the **theoretical, conceptual and practical aspects of the area of interest**.

CRITERIA FOR SELECTING A RESEARCH PROBLEM

- **The problem should be sufficiently original**. One needs to posses personality attributes of creativity, flexibility and foresight to be able to select a research problem that does not involve blind and objectionable duplications.
- **The problem must be feasible**
- **The problem must be one that investigated and completed within the allocated time limit**.
- **Subject which is overdone should not be normally chosen**

CRITERIA FOR SELECTING A RESEARCH PROBLEM



CRITERIA FOR SELECTING A RESEARCH PROBLEM

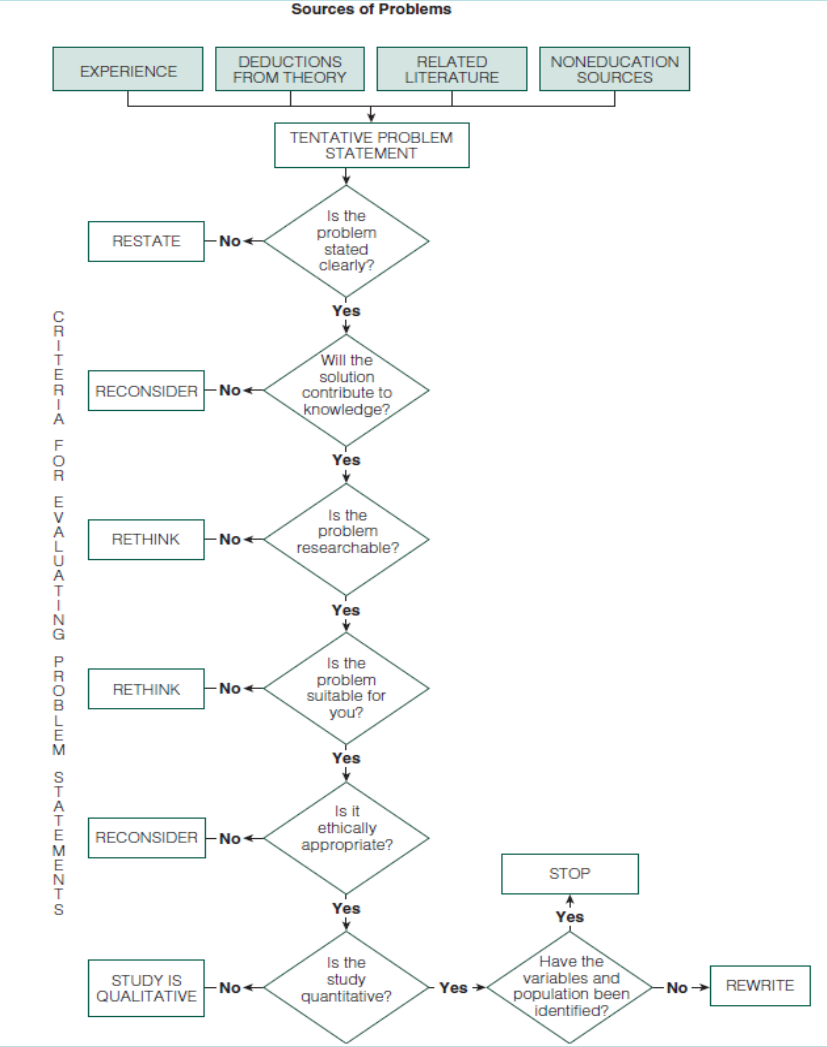
- **Too narrow or too vague problems should be avoided**
- In general, the **importance of the subject, the qualifications** and **the training of a researcher, the costs involved, the time factor** are few other criteria that must also be considered in selecting a problem.

CRITERIA FOR SELECTING A RESEARCH PROBLEM

In summary, the characteristics of a very good research problem is listed below :

- ***The problem is significant***
- ***The problem will lead further research***
- ***The problem is researchable*** (it can be investigated through the collection of data)
- ***The problem is suitable*** (it is interesting and suits the researchers skills and available resource
- ***The problem is ethical*** (it will not cause harm to subjects)

CRITERIA FOR SELECTING A RESEARCH PROBLEM



2.3. EVALUATION OF THE RESEARCH PROBLEM

- Will the research results have social, educational or scientific value?
- Will it be possible to apply the results in practice?
- Will the research opt new problems and lead to further research?
- Is there enough reach gap left within the area of research ?
- Will it be possible for another researcher to repeat the research?
- Are you motivated to undertake the research?

CRITERIA FOR SELECTING A RESEARCH PROBLEM

- Do you have the necessary knowledge and skills to do the research?
- Do you have the necessary funds for the research?
- Do you have access to the administrative, statistic and computer facilities the research necessitates?
- Is the problem new?
- Is the solution to this problem helpful for the development of further knowledge?
- Is the problem feasible for researcher?

2. 3. NECESSITY OF DEFINING THE PROBLEM

- **Quite often we all hear that a problem clearly stated is a problem half solved.**
- **A proper definition of research problem will enable the researcher to be on the track** whereas an ill-defined problem may create hurdles.
- **Thus, defining a research problem properly is a prerequisite for any study and is a step of the highest importance.**

2. 4. TECHNIQUE INVOLVED IN DEFINING A PROBLEM

Techniques involved are:

- Statement of the problem in a general way
- Understanding the nature of the problem
- Surveying the available literature
- Developing the ideas through discussions
- Rephrasing the research problem into a working proposition

2.5. PROBLEM STATEMENT

- A concise wording of the problem to be tackled.
- Your research problem statement is the foundation and focus of your research report.
- It is a clear, stand-alone statement that makes explicit what it is you are aiming to discover or establish. ***A good problem statement is specific***.
- Many researchers have difficulty formulating a concise problem statement.
- The statement of the problem is sometimes written as a separate chapter and sometimes located at the very end of the review literature.

2.5. PROBLEM STATEMENT

At a minimum, a problem statement should include :

- **What** is the problem or defect ?
- **Magnitude** of the problem ?
- **Where** is the problem ?
- **Why** is it important to work on this problem ?

2.5. PROBLEM STATEMENT

1. Pizza Delivery Times : Pizza delivery times ***at the Westside location*** have *been* ***averaging 38 minutes on Friday and Saturday nights*** (high volume methods). As a result, ***20 % of the Pizzas are being delivered late*** (past 30 minutes). Delivering piazza in less than 30 minutes is crucial to ***increase revenue and customer satisfaction***.

2.5. PROBLEM STATEMENT

2. Problem statements can be formatted as a bulleted list or as paragraph:

- **What is the problem** : High defect rates
- **Magnitude** of the problem : 4.5 % of production
- **Where is the problem** : Assembly Line 1
- **Why is it so important** : Reducing defects is critical to improve customer satisfaction.

2.5. PROBLEM STATEMENT

3. Second shift assembly line 1 is producing defects at a rate of 4.5 % of production (based on the number of returns we are receiving from customers). Reducing defects is critical to improve customer satisfaction.

2.5. PROBLEM STATEMENT

4. Even though plastic is a useful and versatile material with a wide range of applications, the disposal of plastic waste is problematic since they are durable and persist in the environment. The monitoring of plastic waste and research into its impacts are still in their infancy, but so far the implications are worrying. Besides, the problem of plastics in developing countries is tripled since there is no proper waste management to effectively either recycle or to recovery energy from plastic waste.

2.5. PROBLEM STATEMENT

- Thus, recovery energy from plastic waste by producing liquid fuels will be a great *benefits by solving the energy problems in developing, reducing their environmental impacts and generating incomes.* Thus, in this work a novel Waste-to-liquid fuels technology is designed, manufactured and tested to be ready for the society. The technology is intended to be a low cost machine and serve the whole population of Ethiopia

QUAD CHART

Aims/Objective

- *Why this project should be done ?*
- *What for ?*

Audience or Stakeholders

- *Who will be benefited for this project ?*
- *Who will be involved in this project ?*

Innovation:

What is new in this project ?

Was it not done by others before ?

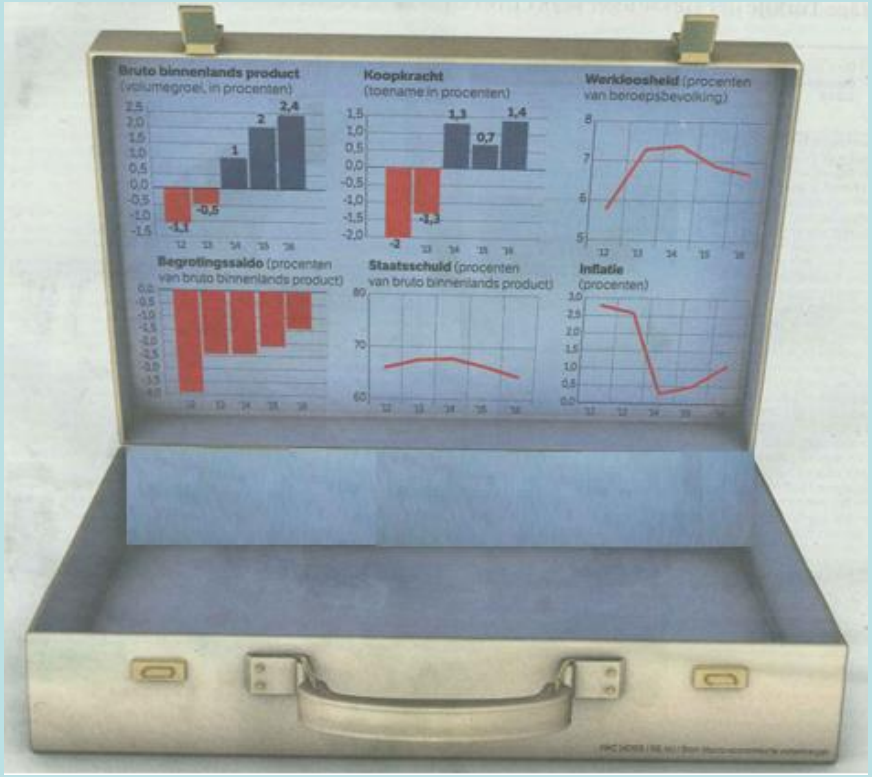
What make this project different ?

Impact

- *What is the impact of your research for the community/industry etc.?*

EXPECTED OUTCOME VISUALIZATION

- Visualize all your results (graphs, tables that you are expected to produce)



End of Module 2