SCIENCE and SCIENTIFIC RESEARCH: PRINCIPLES, METHODS, and PRACTICES

Firmino Silva
firmino.silva@islagaia.pt
https://www.linkedin.com/in/firmino-silva/

What is **science?**

Science refers to a systematic and organized body of knowledge in any area of inquiry that is acquired using “the scientific method”.

Science can be grouped into two broad categories: **natural science** and **social science**.

Natural science

is the science of naturally occurring objects or phenomena, such as light, objects, matter, earth, celestial bodies, or the human body.

Natural science

can be further classified into physical sciences, earth sciences, life sciences, and others

Natural science

Physical sciences consist of disciplines such as physics (the science of physical objects), chemistry (the science of matter), and astronomy (the science of celestial objects).

Earth sciences consist of disciplines such as geology (the science of the earth).

Life sciences include disciplines such as biology (the science of human bodies) and botany (the science of plants)

Social science

is the science of people or collections of people, such as groups, firms, societies, or economies, and their individual or collective behaviors.

Social science

can be classified into disciplines such as psychology (the science of human behaviors), sociology (the science of social groups), and economics (the science of firms, markets, and economies).

Natural sciences

are very precise, accurate, deterministic, and independent of the person making the scientific observations.

Natural sciences

For instance, a scientific experiment in physics, such as measuring the speed of sound through a certain media, should always yield the exact same results, irrespective of the time or place of the experiment, or the person conducting the experiment.

Social sciences

tend to be less accurate, deterministic, or unambiguous.

Social sciences

For instance, if you measure a person's happiness using a hypothetical instrument, you may find that the same person is more happy or less happy (or sad) on different days and sometimes, at different times on the same day.

Social sciences

there is a high degree of *measurement error* in the social sciences and there is considerable uncertainty and little agreement on social science policy decisions.

Natural / Social sciences

you will not find many disagreements among natural scientists on the speed of light or the speed of the earth around the sun, but you will find numerous disagreements among social scientists on how to solve a social problem such as reduce global terrorism or rescue an economy from a recession.

Sciences can also be classified based on their purpose

Basic sciences (pure sciences)

are those that explain the most basic objects and forces, relationships between them, and laws governing them.
Examples include physics, mathematics, and biology.

Applied sciences (pratical sciences)

are sciences that apply scientific knowledge from basic sciences in a physical environment

Applied sciences (pratical sciences)

Example: **engineering is an applied science** that applies the laws of physics and chemistry for practical applications such as building stronger bridges or fuel-efficient combustion engines, while medicine is an applied science that applies the laws of biology for solving human ailments.

Both **basic** and **applied sciences** are required for human development. However, applied sciences cannot stand on their own right, but instead relies on basic sciences for its progress.