

## SCIENCE, TECHNOLOGY, AND SOCIETY (STS) — REVIEWER

Science and technology are shaped by society and, in turn, they transform it. There are four main factors that influence their development: social needs, cultural values, political forces, and economic conditions. Each of these affects how research and innovation grow and how they impact people's lives.

### 1. SOCIAL NEEDS

People's daily needs such as health, education, communication, security, food, and shelter encourage the creation of new technologies.

Examples:

- Vaccines and medicines were developed in response to deadly diseases.
- Telephone, internet, and smartphones improved communication.
- E-learning platforms made education more accessible.

Impact:

Science and technology improve the quality of life. However, unequal access can widen the gap between people, such as those in rural areas who may not have internet access.

### 2. CULTURAL VALUES

Traditions, beliefs, and lifestyles shape how communities accept or reject technology.

Examples:

- Traditional medicine versus modern medicine.
- Social media spreads culture but also increases the risk of misinformation.
- Some cultures quickly embrace change, while others prefer to preserve traditions.

Impact:

Culture influences how technology is used (for example, green energy is popular in eco-friendly cultures), while technology also changes cultural identity and how people communicate.

### 3. POLITICAL FORCES

Government actions, decisions, and funding guide the direction of science and technology.

Examples:

- Space programs such as NASA and SpaceX represent national pride and defense.
- Environmental policies encourage the development of clean energy technologies.
- Wars can lead to the misuse of science, such as the creation of nuclear weapons.

Impact:

Government policies determine which technologies are prioritized and developed. Political stability also affects the progress of science and technology.

#### 4. ECONOMIC CONDITIONS

The wealth and resources of a nation determine how much it can invest in science and technology.

Examples:

- Rich countries invest in advanced technologies such as artificial intelligence, robotics, and biotechnology.
- Developing countries focus on practical solutions such as mobile banking (GCash, PayMaya).
- Economic crises reduce funding for research and innovation.

Impact:

Technology helps drive economic growth, creates jobs, and increases productivity. However, automation can replace workers, and wealthier nations advance faster, leading to global inequalities.

## INTELLECTUAL REVOLUTIONS AND DEVELOPMENT OF SCIENCE — REVIEWER

### SCIENCE DEFINED

1. Science as an idea – consists of theories and explanations about the natural and physical world.
2. Science as an intellectual activity – involves systematic observation and experimentation.
3. Science as a body of knowledge – a field or discipline that studies the natural and physical world.
4. Science as a personal and social activity – activities by humans to understand and improve life.

### INTELLECTUAL REVOLUTIONS

1. Freudian Revolution (Sigmund Freud)
  - Focused on psychoanalysis, a method to study the human mind and treat mental illness.
  - Highlighted human sexuality and unconscious motivations as key to personality development.
2. Copernican Revolution (Nicolaus Copernicus)
  - Rejected the idea that Earth is the center of the universe (Ptolemaic model).
  - Proposed the heliocentric model: the Sun is the center, and planets revolve around it.
3. Darwinian Revolution (Charles Darwin)
  - Introduced the theory of evolution through natural selection.
  - Stated that humans evolved over time, challenging the traditional Creation theory.

### DEVELOPMENT OF SCIENCE IN MESOAMERICA

1. Mayan Civilization – advanced in astronomy and mathematics, created two calendars (Tzolk'in and Haab'), and developed writing (hieroglyphics).
2. Inca Civilization – built stone roads and earthquake-resistant structures; used irrigation systems, quipu for record-keeping, and created suspension bridges.
3. Aztec Civilization – introduced mandatory education, chocolate from cacao, antispasmodic medicine, chinampa farming, Aztec calendar, and canoes.

### DEVELOPMENT OF SCIENCE IN ASIA

1. India – developed metallurgy, medicine using plants, accurate measurement tools, and astronomical theories about Earth and the universe.
2. China – invented compass, papermaking, gunpowder, and printing; advanced in astronomy and traditional medicine.
3. Middle East – emphasized experimentation and contributed to modern chemistry, mathematics, astronomy, and philosophy.

## DEVELOPMENT OF SCIENCE IN AFRICA

- Egyptians built pyramids, dams, and irrigation systems, showing advanced engineering and architecture long before European colonization.

## SCIENCE, TECHNOLOGY, AND NATION-BUILDING IN THE PHILIPPINES

1. Pre-Spanish Period – Early Filipinos used science in farming, fishing, tool-making, and predicting seasons. They traded with nearby countries for cultural and technological exchange.
2. Spanish Period – Introduced formal education, Western technologies, and new cultural practices through schools and trade (Galleon Trade).
3. American Period – Established public education, hospitals, transportation, and communication systems. Introduced science subjects in schools and improved health and engineering.
4. World War II – Destroyed many facilities and resources, slowing development, but the Filipino spirit to rebuild remained strong.

## GOVERNMENT POLICIES ON SCIENCE AND TECHNOLOGY

- The Department of Science and Technology (DOST) and National Research Council of the Philippines (NCRP) aim to make the country more competitive in science and technology within ASEAN.

### NCRP Policies:

1. Social Sciences and Education – Strengthen education, ICT use, and local food security.
2. Engineering and Physical Sciences – Support S&T degrees, research grants, and independent innovation.
3. Medical and Chemical Sciences – Ensure drug standards, food safety, and research funding.
4. Biological Sciences and Agriculture – Conserve biodiversity and promote indigenous knowledge.

## RESEARCH PRIORITIES IN THE PHILIPPINES

1. Alternative energy
2. Mineral resource use
3. Disease cures
4. Climate change response
5. Food production
6. Natural resource conservation
7. Disaster management
8. Infrastructure development

## FAMOUS FILIPINO SCIENTISTS

- Ramon Barba – Mango tissue culture
- Josefino Comiso – Antarctic satellite studies
- Jose Cruz Jr. – Electrical engineering expert
- Lourdes Cruz – Sea snail venom research
- Fabian Dayrit – Herbal medicine research
- Rafael Guerrero III – Tilapia research
- Enrique Ostrea Jr. – Meconium drug testing
- Lilian Patena – Plant biotechnology
- Mari-Jo Ruiz – Graph theory educator
- Gregory Tangonan – Communications technology

Other notable scientists: Caesar Saloma, Edgardo Gomez, William Padolina, Angel Alcala.

## **Reviewer: Human Flourishing in Terms of Science and Technology**

### **Human Flourishing (Eudaimonia)**

- From Aristotle's concept meaning living with virtue, purpose, and excellence.
- Involves developing human capacities—knowledge, creativity, relationships, and well-being.
- Science and technology can both help and hinder this pursuit depending on how they are used.

### **Martin Heidegger's View on Technology**

- German philosopher (1889–1976).
- Believed technology is not neutral—it changes how we see the world.
- Warned that viewing everything (even people) as resources for use can harm true human flourishing.

### **Historical Impacts on Human Flourishing**

- Agriculture: Shifted societies from nomadic to settled life; led to stable food and civilizations.
- Printing Press: Spread knowledge widely; led to Renaissance and Enlightenment.
- Industrial Revolution: Increased production and living standards but caused social and environmental issues.

### **Science, Technology, and Human Well-Being**

- Health & Medicine: Vaccines, antibiotics, and genetic engineering increased life expectancy. Telemedicine and health devices make healthcare more accessible (WHO, 2021).
- Education & Knowledge: Digital tools and online platforms provide global learning access (UNESCO, 2020).
- Economic Development: Automation, AI, and renewable energy improve productivity and living standards (World Bank, 2019).
- Social Connectivity: Internet and social media connect people globally but can also cause misinformation and addiction.

### **Challenges of Science and Technology**

- Ethical Concerns – Issues in AI, surveillance, and genetics affecting privacy and human rights.
- Environmental Impact – Industrialization leads to pollution, climate change, and biodiversity loss.
- Digital Divide – Unequal access to technology causes social and educational inequalities.

### **The Future: Towards a More Flourishing World**

- Ethical AI: Must align with fairness and human values, enhancing—not replacing—human roles.
- Sustainable Technology: Focus on renewable energy and eco-friendly innovation to protect the environment.

### **Human Flourishing in the Age of Science and Technology**

- True progress means balancing advancement with ethics, justice, equality, and environmental care.
- Flourishing involves both material progress and moral responsibility.

## **Reviewer: Government Laws, Policies, Plans, and Projects Pertaining to Science and Technology**

### **Overview**

Science and technology play a key role in national development and economic growth. The Philippine government has enacted laws, policies, plans, and projects to promote innovation, research, and the use of modern technologies to address the needs of the Filipino people.

### **Government Laws**

Republic Act No. 8439 – Magna Carta for Scientists, Engineers, Researchers, and other S&T Personnel. This law provides benefits and incentives to encourage more Filipinos to pursue science and technology careers. It strengthens the country's research and development workforce.

### **Policies**

National Science and Technology Plan (NSTP) 2022–2028 – This policy aligns with the Philippine Development Plan. It focuses on digital transformation, agricultural modernization, health innovation, and disaster risk reduction. These policies ensure that science and technology contribute to both economic growth and national resilience.

### **Plans**

Harmonized National Research and Development Agenda (HNRDA) – A framework by the Department of Science and Technology (DOST) that sets research priorities in food security, health, energy, environment, and emerging technologies like artificial intelligence. This plan helps universities and institutions align research with national priorities.

### **Projects**

Project NOAH (Nationwide Operational Assessment of Hazards) – A DOST initiative to improve disaster preparedness through advanced technology. It was later transferred to the University of the Philippines and remains a model for technology-driven disaster management.

### **Importance of S&T Initiatives**

Government initiatives in science and technology help build a more resilient and competitive nation. They support local researchers, enhance disaster preparedness, promote digital transformation, and address global challenges like pandemics and climate change.

### **Challenges**

Despite progress, the Philippines still faces challenges such as limited funding, brain drain, and infrastructure gaps. Collaboration between the government, private sector, and academic institutions is vital to maximize the benefits of science and technology.

## Technology as a Way of Revealing

### Generation Gap

The generation gap is mainly caused by rapid technological changes. Older generations often find modern technologies complex, while younger generations adapt easily. This difference in comfort and familiarity creates gaps in communication and understanding.

Science and technology have fascinated people, leading to many inventions that improve modern life.

### Martin Heidegger

Martin Heidegger was a German philosopher and one of the most influential thinkers of the 20th century. In his essay 'The Question Concerning Technology,' he explored the essence of technology, describing it as more than just tools—it is a way of revealing or understanding the world.

### Heidegger's View on Technology

1. Technology is not just something humans create; it is a way of revealing truth and existence.
2. Some aspects we do not usually consider technological—such as gods and history—also reveal truths about humanity.
3. Modern technology is largely shaped by industrialization and human control over nature.
4. Technology is not merely the practical use of science; it changes how humans experience and interpret the world.

### Enframing

Enframing refers to the way modern technology organizes the world as a collection of resources for human use. It turns everything into something that can be controlled or manipulated, removing mystery and wonder from existence.

Heidegger warned that this mindset could lead people away from the true essence of being and truth. To live meaningfully, humans must balance technological progress with an appreciation of mystery and truth.