

LEARN & ACT Teacher's Guide

Industry, Innovation, and Infrastructure



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Introduction 1. Technology development for everyone around the world



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A. Project Loon

Project Loon is a Google project to provide internet access to rural and remote areas. It involves sending hot air balloons to the stratosphere at an altitude of 20km and using it as an internet base station. After years of testing, Google successfully delivered bandwidth in Midwestern Kenya in July 2020, where 30 balloons provided internet service to residents in remote areas including Nairobi, Kenya.



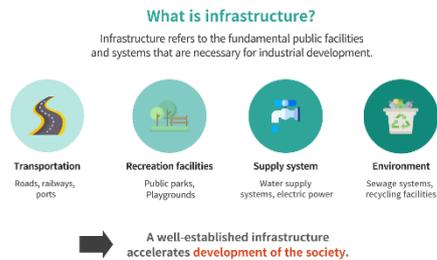
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B. Partially successful due to cost issues

A successful Project Loon can provide distance learning to children who cannot go to school, provide remote medical services to those who live far from health centers, and farmers can double their yields. However, Google decided to cancel this project in 2021 because they did not find a way to lower costs enough to build a long-term, sustainable business. Google explained that although it was an innovative technology that can cover a large area using a simpler method than the existing service but did not prove to be cost-effective.

1. Let's learn about infrastructure (1)

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A. What is infrastructure?

Infrastructure refers to the fundamental public facilities and systems that are necessary for industrial development. It includes all public facilities related to social welfare and convenience for everyone, including roads, parks, markets, schools, sewage systems, etc. A well-established infrastructure accelerates development of the society.

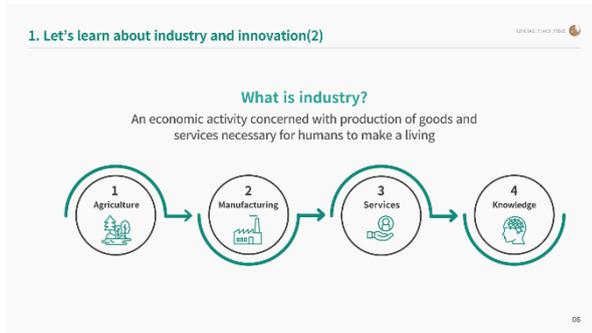
B. Types of infrastructure

- ① Transportation: roads, railways, ports, airports, parking lots, etc.
- ② Recreation facilities: public parks and playgrounds, nature reserves, etc.
- ③ Supply system: water supply systems, electric power, gas pipelines, broadcasting & telecommunication systems, etc.
- ④ Environment-related: Sewage systems, recycling facilities, waste management systems, etc.

C. Infrastructure and profitability

The benefits and services of infrastructure serve all members of the society and contribute to the manufacturing of most products. For example, a railway would facilitate transportation and reduce its costs, which in turn saves production costs, eventually making businesses in the region more profitable.

1. Let's learn about industry and innovation (2)



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A. What is industry?

Industry refers to an economic activity concerned with production of goods and services necessary for humans to make a living. There are four main sectors of industry: *primary sector* involves extraction of raw materials (agriculture, mining, and fishing), *secondary sector* involves producing finished goods (manufacturing and construction), and *tertiary sector* involves offering intangible goods and services to consumers (retail, financial, transportation, and tourism). Recently, *quaternary sector* concerned with knowledge and information based on the development of information and communication technology and the emergence of artificial intelligence is also considered a form of industry.



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B. What is innovation?

Innovation means improving what is unsatisfactory with creative and new methods. Furthermore, it is a concept that represents all processes of developing technology and pursuing economic benefits through it and introducing, developing, and implementing new ideas. The top three innovative technologies of the 21st century are nanotechnology (NT), information and communication technology (ICT), and biotechnology (BT).

1. Let's learn about industry and innovation(2)



07

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C. Industry development brings wealth to society

Industrial activity is the fundamental force behind economic development. Active industrial activities create jobs and increase income. A rise in income increases consumption, which further stimulates industrial activities. In the end, the society become wealthier as the industry develops.



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D. Not everyone benefits from industry, innovation, and infrastructure

Most regions or countries that led innovation and revolution have achieved advanced culture and civilization compared to other neighboring regions. The relatively recent Second Industrial Revolution occurred in England, and in turn, the United States and other countries in Europe benefited from it. The third Industrial Revolution was promoted by the invention of computers, satellites, and the Internet, which affected the growth of the United States, Russia, European countries, and parts of East Asia. The same countries also benefited from the fourth Industrial Revolution with the full-fledged emergence of new ICT and artificial intelligence. In the end, only a select few benefited from industry and innovation, and the global community is once again faced with inequality.

2. Industry, innovation, and infrastructure in underdeveloped countries (1)

04. Infrastructure in underdeveloped countries (1)

SPENDING OVER TIME

Poor infrastructure

- Underdeveloped countries lack basic infrastructure



2.6 billion people
I don't have
electricity.



4 billion people
I can't use
the internet.



2.3 billion people
I don't have
a toilet.



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▶ p.14

A. Poor infrastructure

A successful society needs a well-established infrastructure. However, in many developing countries, infrastructure such as power supply systems, information and communication technology, water resources, roads, and sanitation facilities are very scarce. According to UNDP, limitations in infrastructure in some low-income African countries have reduced corporate productivity by about 40%.

B. 2.6 billion without electricity

2.6 billion people living in developing countries do not have stable electricity use.

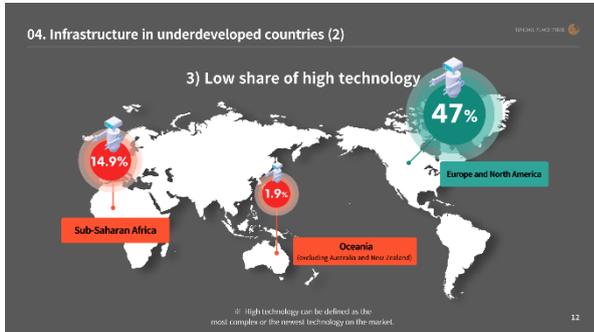
C. 4 billion without internet access

Information and communication technology (ICT) contributes greatly to development of society. Building an efficient and affordable information and communication infrastructure helps countries to improve competitiveness and improve the lives of their residents. According to UNDP statistics, more than 4 billion people around the world do not have access to the internet, and 90% of them live in developing countries. In addition, 16% of the world's population does not have access to broadband mobile networks.

D. 2.3 billion without toilets

2.3 billion people around the world do not have access to basic sanitation such as toilets. Lack of these facilities cause various waterborne diseases and hinder the development of society.

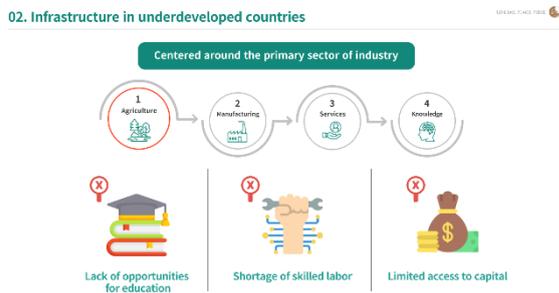
2. Industry, innovation, and infrastructure in underdeveloped countries (2)



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A. Low share of high technology

Since the 2000s, production and consumption of medium and high-tech industries (MHT industries), such as televisions, telecommunication devices, and home appliances, have soared. According to the UN, the proportion of the upper and middle high-tech industries in the total industry increased from 40.5% in 2000 to 44.7% in 2016. The development of high-tech manufacturing is also underway with regional gaps. Market value added in this area accounted for more than 47% of the total in Eastern, Southeast Asia and Europe and North America, but only 1.9% and 14.9% of the total in Oceania and Sub-Saharan Africa, excluding Australia and New Zealand (UN, 2016).



► p.16

B.Centered around the primary sector of industry

Industrial activities related to the primary sector such as agriculture and fishing are dominant in underdeveloped countries. Manufacturing (industry that produces new products by processing raw materials) and service industries in many underdeveloped countries in the African continent are still very weak, mainly due to lack of opportunities for education, shortage of skilled labor, and limited access to capital.

3. Goal of the international community for industry, innovation, and infrastructure

03. Goal of the international community for industry, innovation, and infrastructure



UN Sustainable Development Goal #9
‘Industry, Innovation, and Infrastructure’

Significance of industry, innovation, and infrastructure

Balanced growth without harming the environment by solving various issues related to industry and infrastructure.

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A. UN Sustainable Development Goal #9 Industry, Innovation, and Infrastructure

Sustainable Development Goals (SDGs) are 17 global goals adopted by the United Nations General Assembly in 2015 and are intended to be achieved by 2030

B. Significance of industry, innovation, and infrastructure

The UN goal of industry, innovation, and infrastructure promotes sustainable development and balanced growth without harming the environment by solving various issues related to industry and infrastructure.

06. Goal of the international community for industry, innovation, and infrastructure



SDGs 9. Targets

- 9.1 Develop quality, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
- 9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries
- 9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets
- 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
- 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

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C. SDGs 9. Targets

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4. Most important tasks in industry, innovation, and infrastructure



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A. Foster industries using abundant resources and labor

The least developed countries have abundant natural resources and labor force, which are unique to them. They can utilize their immense potential for industrialization in food and beverages (agro-industry), and textiles and garments, with good prospects for sustained employment generation and higher productivity.

B. Strengthening support for small enterprises

Small businesses in manufacturing are very important in the early stages of industrialization and generally create the greatest number of jobs. UNIDO's latest data in 2021 shows that 90% of all businesses worldwide are carried out by small enterprises and account for 56-60% of employment. They play a key role in developing countries as a route to escape poverty and should receive more support.

C. R&D investment and technology transfer

Closing the R&D gap between countries is a long-term investment toward coexistence and balanced development on a global level. Underdeveloped countries are in urgent need of active technology transfer and development cooperation from developed countries.

D. Improving ICT accessibility

Expanding the ICT infrastructure in developing countries is essential for a better future of the countries. Information and communications technology plays an important role in human life on a personal level as well as in industrial sites and in pursuit of worldwide sustainable development.

5. International efforts for industry, innovation, and infrastructure

05. International efforts for industry, innovation, and infrastructure

| 1) International organizations



UNIDO
United Nations Industrial
Development Organization



ITU
International
Telecommunication Union



RIGHT Fund
A global health research
funding group

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▶ p.22

1) International organizations

A. United Nations Industrial Development Organization (UNIDO)

It is a specialized agency of the United Nations that promotes poverty reduction, inclusive globalization and environment-friendly and sustainable industrial development. It was established in 1986 and works under the vision of *inclusive and sustainable industrial development (ISID)*.

B. International Telecommunication Union (ITU)

It is an UN-affiliated organization promoting international cooperation to build infrastructure related to electricity and telecommunications around the world. It was established as the International Telegraph Union in Paris in 1865. Then in 1932, it adopted the current name International Telecommunication Union at the International Telegraph Conference held in Madrid. It has the longest history among existing UN agencies.

C. RIGHT Fund, a global health research funding group

It is a non-profit organization established in 2018 to assist in international collaboration to develop solving public health issues and build infrastructure in developing countries. It supports research and development of health technologies such as immune-diagnosis of tuberculosis with high-sensitivity, COVID-19 diagnostic device linked to mobile app, typhoid conjugate vaccine, recombinant polio vaccine, etc.

05. International efforts for industry, innovation, and infrastructure

| 2) Various ideas



Samoa youths enter organic farming and organic menu development industry

- Provides food processing facilities
- Supports training in related technologies



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2) Other ideas

A. Samoa youths enter organic farming and organic menu development industry

Samoa is a small island development state (SIDS) and suffers from economic instability and food shortages just like other island nations in the Pacific Ocean. UNDP operates the program “Farm to Table” to address youth unemployment and revolutionize the industry. The goal is to solve some of Samoa’s economic problems by providing food processing facilities and training in related technologies. Through this program, 574 youths received education in technology and knowledge about organic farming, and 1,027 farmers completed the training in organic farming technology, which resulted in a 36% increase in organic production.

05. International efforts for industry, innovation, and infrastructure

| 2) Various ideas



Technovation Challenge for girls in Tunisia

- Projects to promote **high-tech capabilities** for girls aged 10 to 18 across Tunisia



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B. Technovation Challenge for girls in Tunisia

It is a global initiative that invites girls across Tunisia aged 10 to 18 for the opportunity to learn and apply high technologies in their community. Since 2015, a national competition is held once a year to evaluate the projects to determine the winning team. Project themes to participate in the Technovation Challenge are related to global prosperity, including poverty reduction, quality education, health and welfare, climate action, peace, and justice, which are in line with the SDGs.

9. Brainstorm ways to improve global industry, innovation, and infrastructure



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What can we do to improve global industry, innovation, and infrastructure?