

# UNIT-I

# INNOVATION OVERVIEW

# UNIT-I : INNOVATION OVERVIEW

- Innovation Overview
- Industry 4.0, Sustainable Development Goals, and
- Need for Innovation
- Innovation in the context of Business, Engineering, and Computer Science
- Sources of innovation, Knowledge push vs. Need pull innovations
- Radical Innovation, Incremental Innovation, Disruptive Innovation, Open Innovation, Jugaad,
- Collaborating for Innovation; Three lenses of innovation – Desirability, Feasibility, and Viability

# UNIT-I: INNOVATION OVERVIEW

- **Definition of Innovation:**
- **Innovation** is the process through which an individual or organization embarks on creating entirely fresh products, processes, and concepts, or reimagining existing products, processes, and concepts in novel ways.
- it's about reshaping how organizations operate, **enhance value creation**, and interact with stakeholders.

# UNDERSTANDING INNOVATION

- New/ Improved product/ process that differs significantly from previous products/ processes
- Not an invention but implementation of invention in useful ways to transform ideas into reality
  - Invention: an idea, a concept or design for a new or enhanced product, system or process
  - Can be a combination or ideas
  - Value addition through change or improvement in existing product/ process
  - Marketability indicates usefulness
- Must have one or more features that were not made available in previous offerings of the organisation
  - Enhancements must be relevant to the organisation or to users

# NEED FOR INNOVATION

- Builds competitive advantage
- Improves productivity
- Penetrates in new markets, find new opportunities
- Builds enhanced products and services to the customers
- Increases market share/profitability
- Motivates employees to work and improves employee retention
- Enhances brand value

# WHAT IS NOT INNOVATION?

- Routine changes or updates
  - software updates, bug fixing
  - general rearrangement of stuff in stores
- Equipment replacement/ upgrade
- Products with minor changes for aesthetics
- Minor changes in a business process implemented elsewhere within the firm

# INNOVATION AND BRANDING

- **Innovation:** giving users something unexpected, solving problems that are tough for them to realize
- **Brand:** repeated process of giving customers what they expect
- Innovation + Brand Value = Stable and Sustainable Presence and Growth

# INDUSTRY 4.0



## A Timeline of Industrial Revolutions

INDUSTRY 1.0  
Y1765

- Steam engine: Efficient generation of energy
- Emergence of industrial mechanisation
- Period of proto-industrialisation
- High economic growth

INDUSTRY 2.0  
Y1870

- Electricity: Channelizing and transporting power
- Communication methods revolutionized
- Centralizing of capital via large factories
- Taylor and Ford's models

INDUSTRY 3.0  
Y1969

- Automation: Establishing control over processes
- Conceptualization of automation and robotics
- Establishing control via electronics, computers
- Miniaturizing technology

INDUSTRY 4.0  
NOW

- Internet: Creating integration and cohesion
- Digitalization enabling creation of a virtual world
- Connecting humans and objects for common goal
- Reduced human activity

# INDUSTRY 4.0



- **THE DEUTSCH DOCUMENT**

- The German government came up with a document introducing "**Industrie 4.0**"
- "...way to deal quickly with the fusion of the online world and the world of industrial production."
- German Chancellor Angela Merkel  
World Economic Forum  
Davos 2013
- "**Define, design, analyse, identify**"
- - purpose of the document  
Investment worth €200 by the German government

## THE GENESIS OF 4.0

- **CONCEPTUALIZING 4.0**

- Industry 3.0 achieved automation of manufacturing technologies
- Needs for customization and flexibility in mass production propelled the need for 4.0
- Advancements in ICT enhanced man-machine interactions:
  - Self-optimization
  - Self-cognition
  - Self-customization



## COMPONENTS OF INDUSTRY 4.0

### INTERNET OF THINGS (IOT)

- Enabling direct communication: Machine-to-machine & machine-to-human
- Choice between human intervention
- Cooperation includes resolution of conflict of machine goals

### INTERNET OF SERVICES (IOS)

- Simplifying human coordination by establishing networks between service enabled devices
- Greater the number of connected devices, lesser the importance of the individual node

### SMART FACTORIES

- Calm systems: Deals with physical world and virtual world
- Human intensive manufacturing units to benefit from "Dark Factories" - Lights Out Manufacturing
- **"Act only when absolutely"**

### CYBER PHYSICAL SYSTEMS

- Integrates computation and physical processes
- Three phases of CPS
  - Identification (RFID)
  - Integration (DCS)
  - Development (ML)



## WHY 4.0?

### OPTIMIZED PRODUCTION

Research shows that excess revenue generated by optimized production using 4.0 systems contributes significantly to the company top-line.

**“Digitized products and services generate approximately €110 billion of additional revenues per year for the European industry.”**

### EDUCATION AND RESEARCH

Development of Industry 4.0 technologies will push frontiers of research in tech, data security, etc thereby increasing employment and training. An emerging skilled labour force will find new employment opportunities in this domain.

### CUSTOMER FOCUS

The gap between the manufacturer and the consumer is greatly reduced by the degree of flexibility and customization offered by Industry 4.0 techniques.

Communication channels are becoming more transparent and efficient with the use of 4.0 elements.

# SUSTAINABLE DEVELOPMENT GOALS

- The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future.
- At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership.
- They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve **health and education, reduce inequality, and spur economic growth** – all while tackling **climate change and working to preserve our oceans and forests**.

# SUSTAINABLE DEVELOPMENT GOALS

- No Poverty
- Zero Hunger
- Good Health and Well-Being
- Quality Education
- Gender equality
- Clean Water and Sanitation
- Affordable and Clean Energy
- Decent Work and Economic Growth
- Industry, Innovation and infrastructure
- Reduced inequalities
- Sustainable Cities and Communities
- Responsible consumption and Production
- Climate Action
- Life Below Water
- Life on Land
- Peace, Justice and Strong Institutions
- Partnership

# 1. No Poverty



## END POVERTY IN ALL ITS FORMS EVERYWHERE



IF CURRENT  
TRENDS CONTINUE,  
BY 2030

**575 MILLION**  
PEOPLE WILL STILL BE  
LIVING IN EXTREME POVERTY

ONLY ONE THIRD  
OF COUNTRIES WILL HAVE  
HALVED THEIR NATIONAL  
POVERTY LEVELS

MANY OF THE  
**WORLD'S VULNERABLE POPULATION**  
REMAIN UNCOVERED BY SOCIAL PROTECTION

IN LOW-INCOME COUNTRIES, ONLY



RECEIVED SOCIAL PROTECTION CASH BENEFITS  
(2020)

WORLDWIDE, COUNTRIES HAVE **INCREASED GOVERNMENT SPENDING** ON  
ESSENTIAL SERVICES (EDUCATION, HEALTH AND SOCIAL PROTECTION) SINCE 2015



IN RESPONSE TO THE  
COST-OF-LIVING CRISIS,

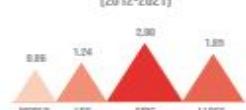


**105 COUNTRIES**  
ANNOUNCED ALMOST  
350 SOCIAL PROTECTION  
MEASURES IN THE PAST

12 MONTHS  
(FEB. 2022 – FEB. 2023)

LDCs, SIDS AND LLDCs  
FACE HIGHER VULNERABILITY  
TO DISASTERS

AVERAGE ANNUAL NUMBER OF  
DEATHS OR MISSING PERSONS  
PER 100,000 POPULATION  
(2012–2021)



- By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day
- By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
- By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property

# 2.Zero Hunger



- By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.
- By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.
- By 2030, double the agricultural productivity and incomes of small-scale food producers.

# 3. Good Health and Well-Being



## ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES

NOTABLE STRIDES HAVE BEEN MADE TOWARDS IMPROVING GLOBAL HEALTH OUTCOMES



146 OUT OF 200 COUNTRIES OR AREAS HAVE ALREADY MET OR ARE ON TRACK TO MEET THE UNDER-5 MORTALITY TARGET



EFFECTIVE HIV TREATMENT HAS CUT GLOBAL AIDS-RELATED DEATHS BY 52% SINCE 2010



AT LEAST ONE NEGLECTED TROPICAL DISEASE HAS BEEN ELIMINATED IN 47 COUNTRIES

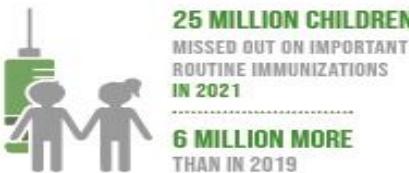


OUT-OF-POCKET PAYMENTS FOR HEALTH PUSHED OR FURTHER PUSHED

381

MILLION PEOPLE  
(4.9% OF POPULATION)

INTO EXTREME POVERTY



MALARIA CASES HAVE SURGED WORLDWIDE

MALARIA CASES [MILLIONS]

232

2019

2020

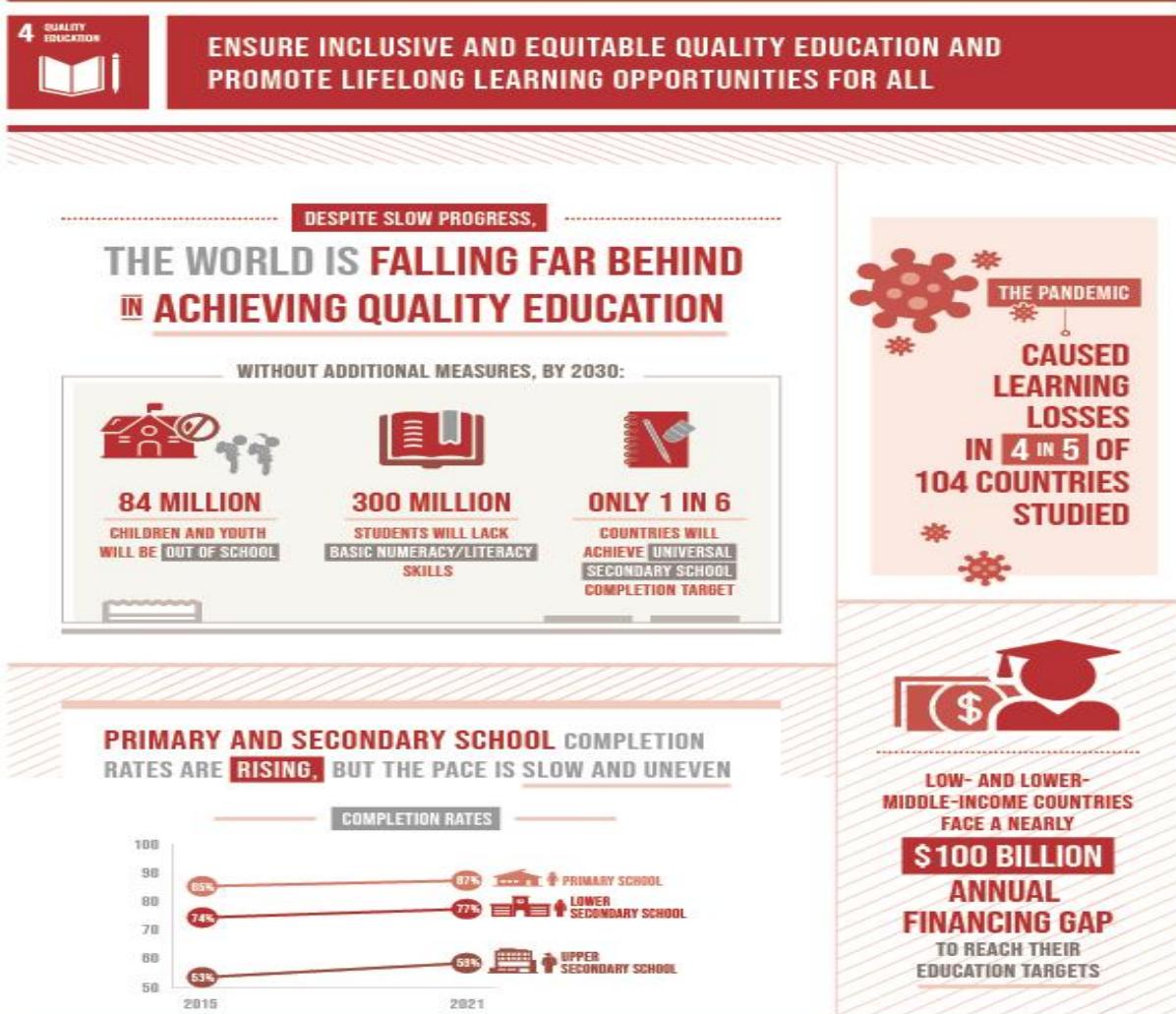
2021

A WOMAN DIES EVERY TWO MINUTES FROM PREVENTABLE CAUSES RELATED TO PREGNANCY AND CHILDBIRTH  
[2020]



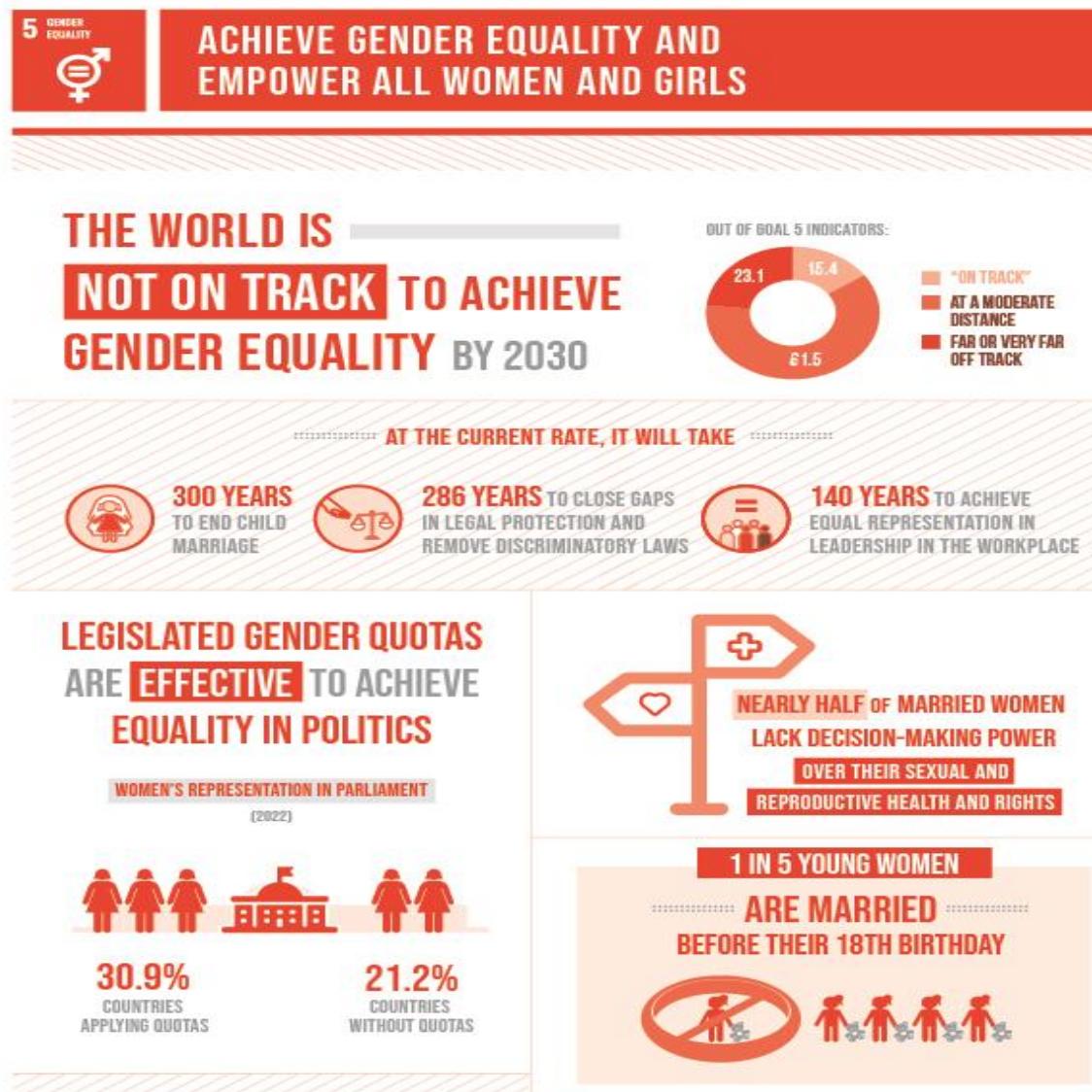
- By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.
- By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce.
- By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
- By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

# 4. Quality Education



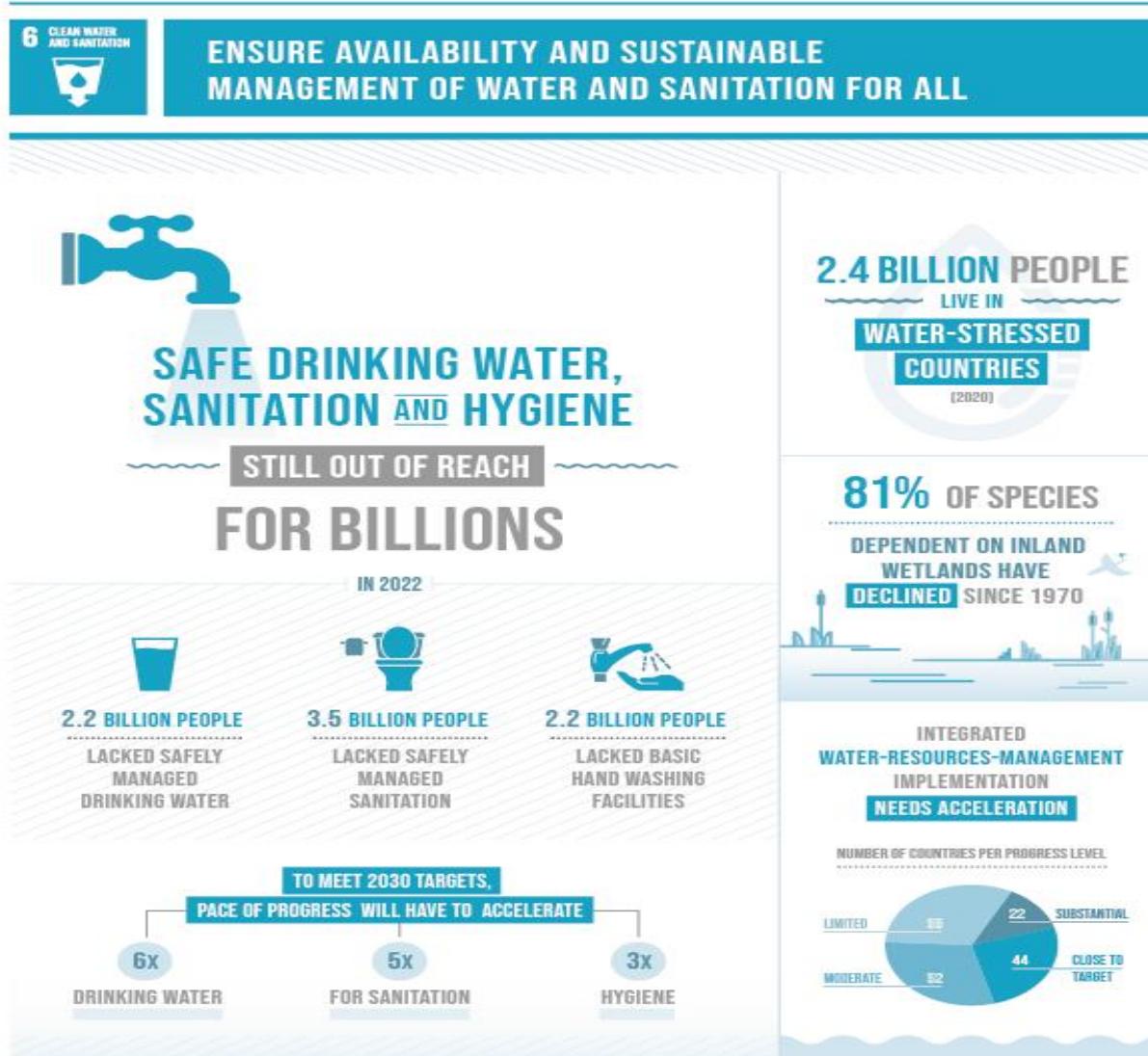
- By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes
- By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education
- By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

# 5. Gender equality



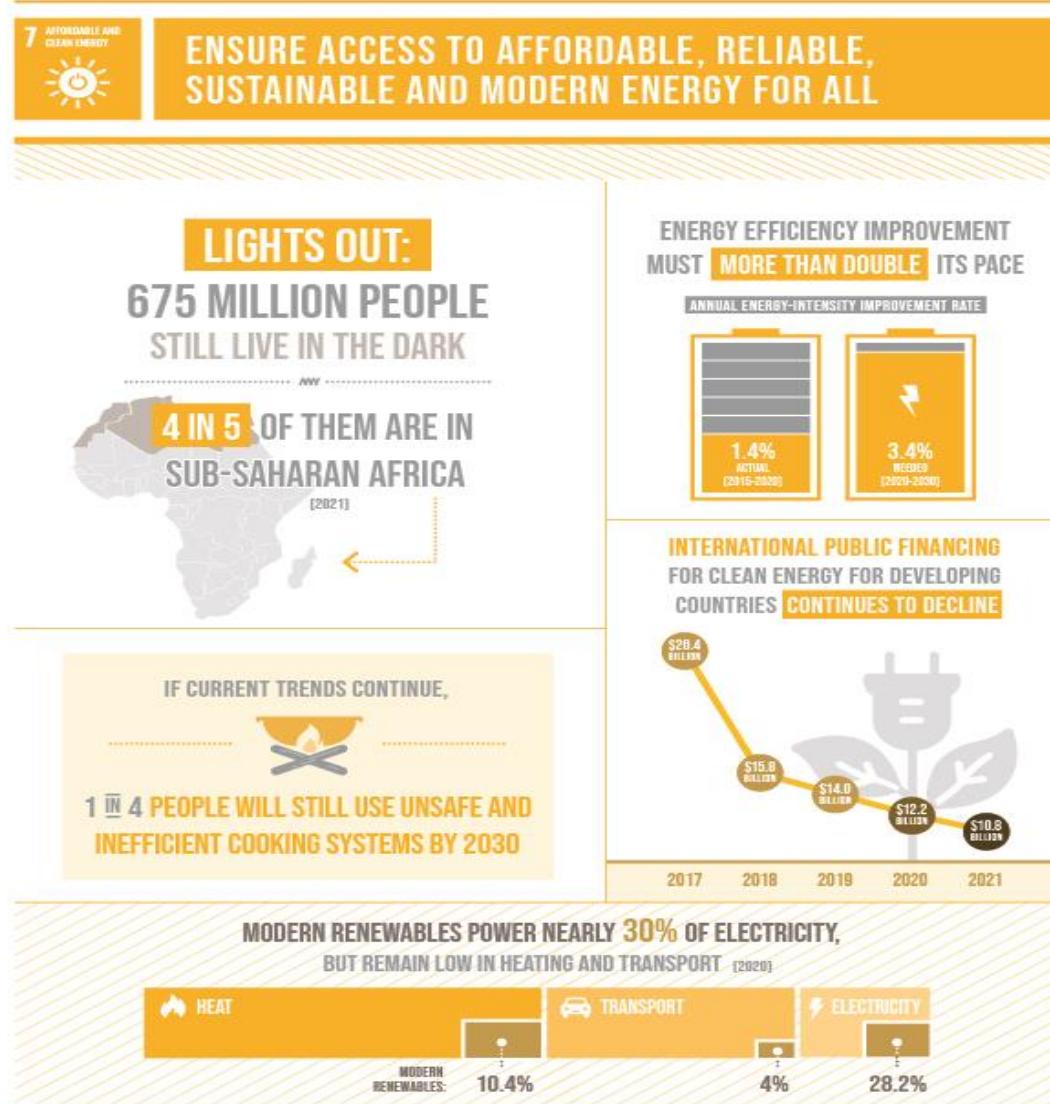
- End all forms of discrimination against all women and girls everywhere
- Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
- Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

# 6. Clean Water and Sanitation



- By 2030, achieve universal and equitable access to safe and affordable drinking water for all
- By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
- By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

# 7. Affordable and Clean Energy



- By 2030, ensure universal access to affordable, reliable and modern energy services
- By 2030, increase substantially the share of renewable energy in the global energy mix
- By 2030, double the global rate of improvement in energy efficiency

# 8. Decent Work and Economic Growth



- Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries
- Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors
- Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

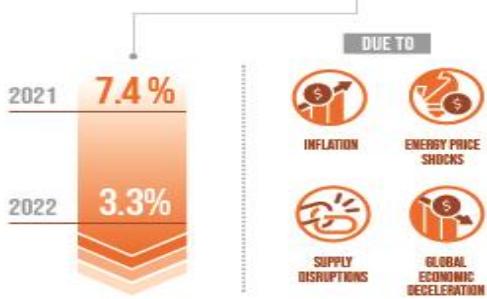
# 9. Industry, Innovation and infrastructure



## BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

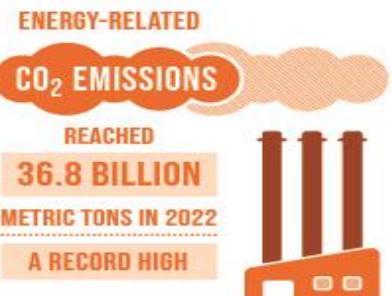
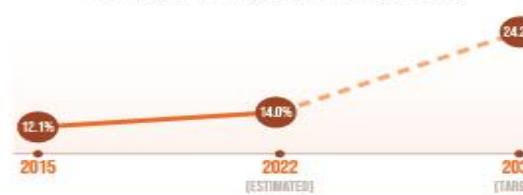
### GLOBAL MANUFACTURING

GROWTH SLOWED FROM



### LDCs ARE LIKELY TO MISS THEIR 2030 TARGET OF DOUBLING MANUFACTURING SHARE OF GDP

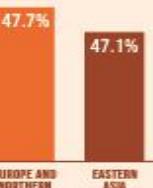
MANUFACTURING VALUE AS A SHARE OF GDP IN LDCs



### MEDIUM-HIGH AND HIGH-TECHNOLOGY INDUSTRIES EXPERIENCED STRONG GROWTH IN 2022

BUT WITH REGIONAL VARIATION

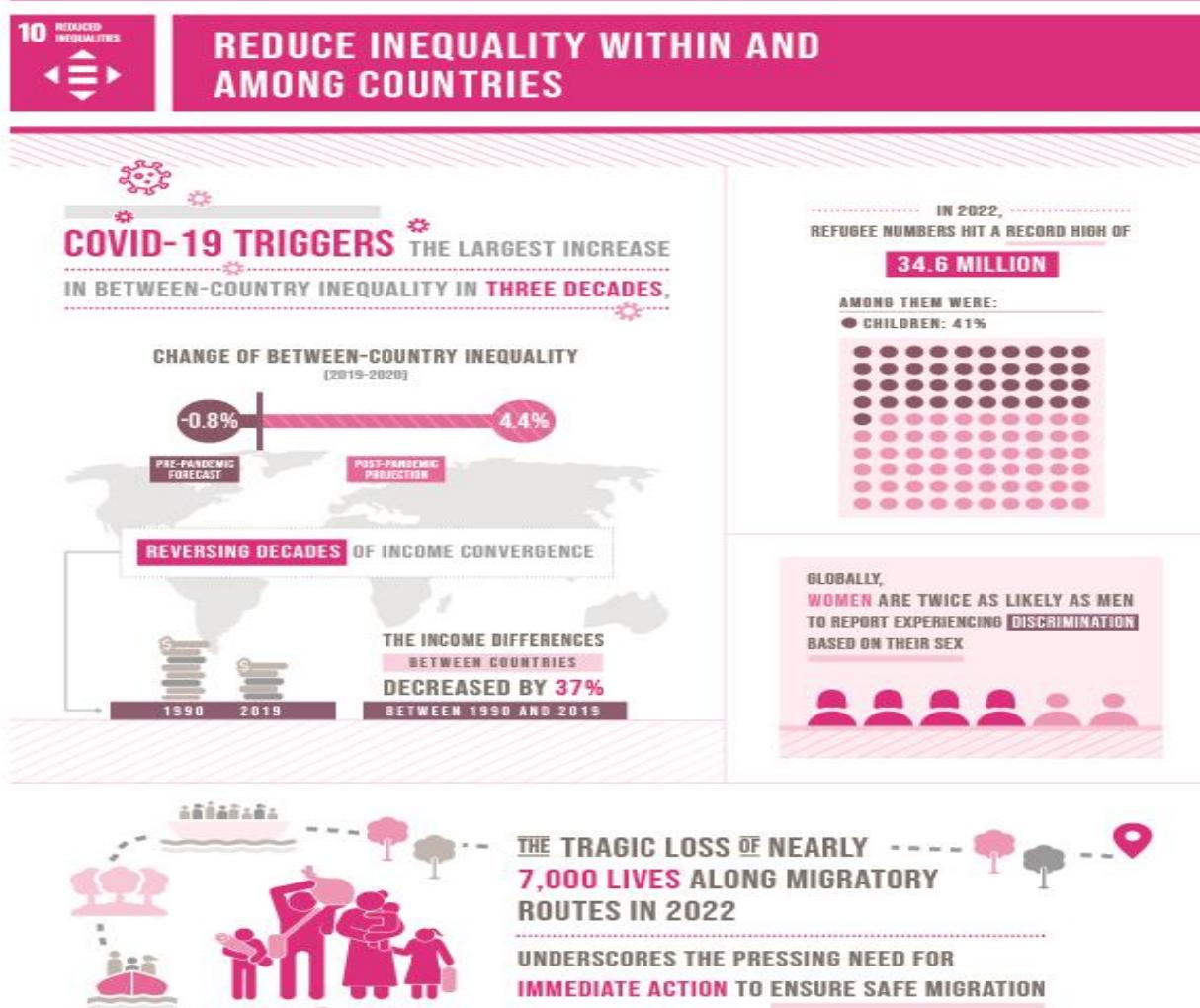
SHARE IN TOTAL MANUFACTURING



95% OF THE WORLD HAS MOBILE BROADBAND ACCESS (3G OR HIGHER) (2022)  
BUT COVERAGE IS ONLY 82% IN SUB-SAHARAN AFRICA AND 68% IN OCEANIA.\*

- Develop quality, reliable, 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.
- 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.
- 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.

# 10. Reduced inequalities



- By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average.
- By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.
- Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard.
- Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality.

# 11. Sustainable Cities and Communities



MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE,  
SAFE, RESILIENT AND SUSTAINABLE

## SLUMS ON THE RISE

1.1 BILLION URBAN  
RESIDENTS ARE  
LIVING IN SLUMS [2020]  
  
2 BILLION MORE ARE EXPECTED  
IN THE NEXT 30 YEARS



AIR POLLUTION IS NO LONGER AN  
EXCLUSIVELY URBAN PROBLEM

TOWNS EXPERIENCE  
POORER AIR QUALITY

THAN CITIES IN EASTERN AND SOUTH-  
EASTERN ASIA [2019]

IN THE DEVELOPING WORLD  
  
1 BILLION PEOPLE LACK ACCESS  
TO ALL-WEATHER ROADS [2022]

GLOBALLY, ONLY  
**ONE IN TWO**  
URBAN RESIDENTS HAVE  
CONVENIENT ACCESS TO  
PUBLIC TRANSPORT  
[2022]



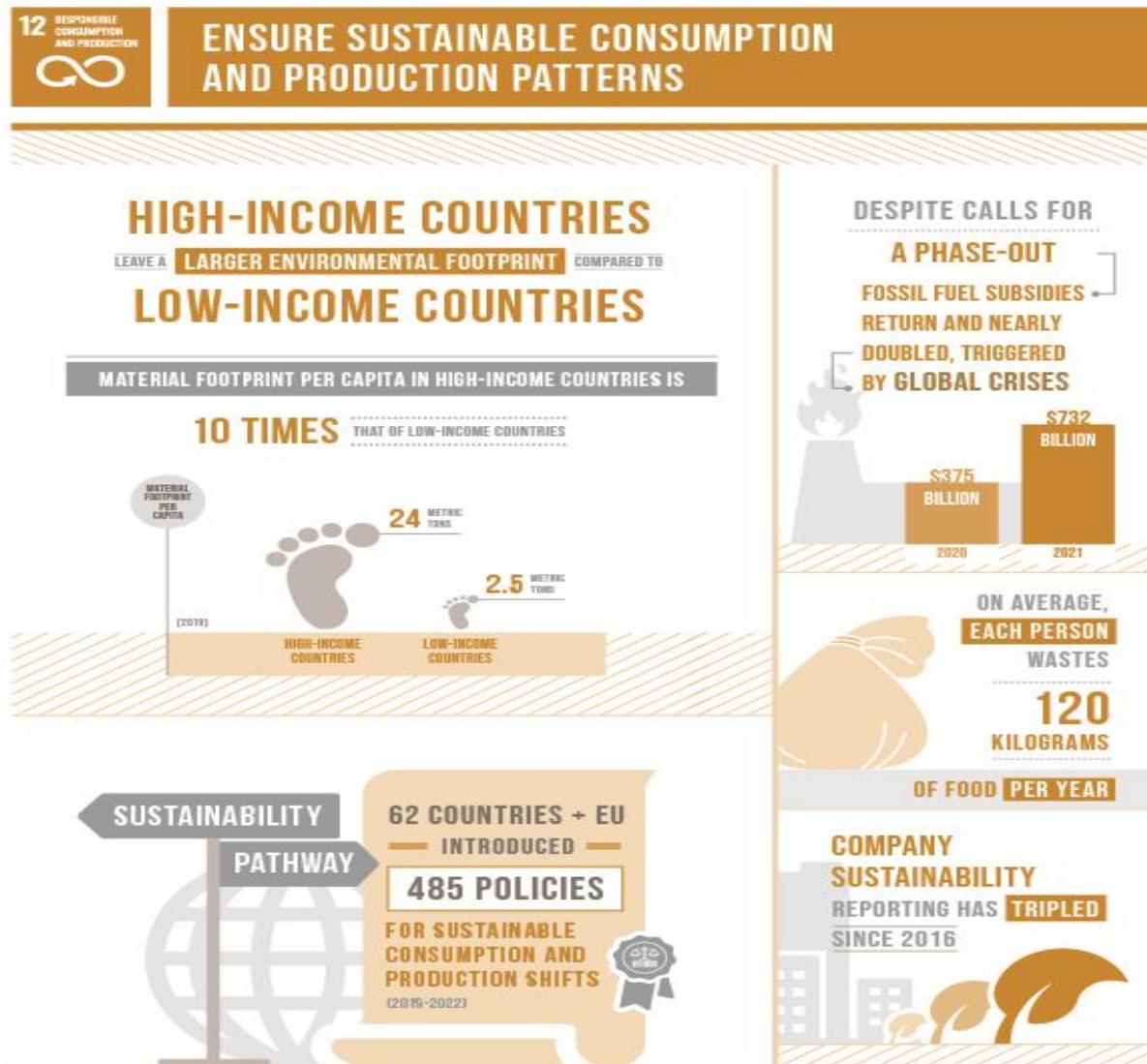
GLOBALLY,  
**3 IN 4 CITIES**



HAVE **LESS THAN 20%**  
OF THEIR AREA DEDICATED TO  
PUBLIC SPACES AND STREETS  
  
MUCH LOWER THAN THE  
TARGET OF 45-50%  
[2020]

- By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.
- By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport.
- Strengthen efforts to protect and safeguard the world's cultural and natural heritage

# 12. Responsible consumption and Production



- Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.
- By 2030, achieve the sustainable management and efficient use of natural resources.
- By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

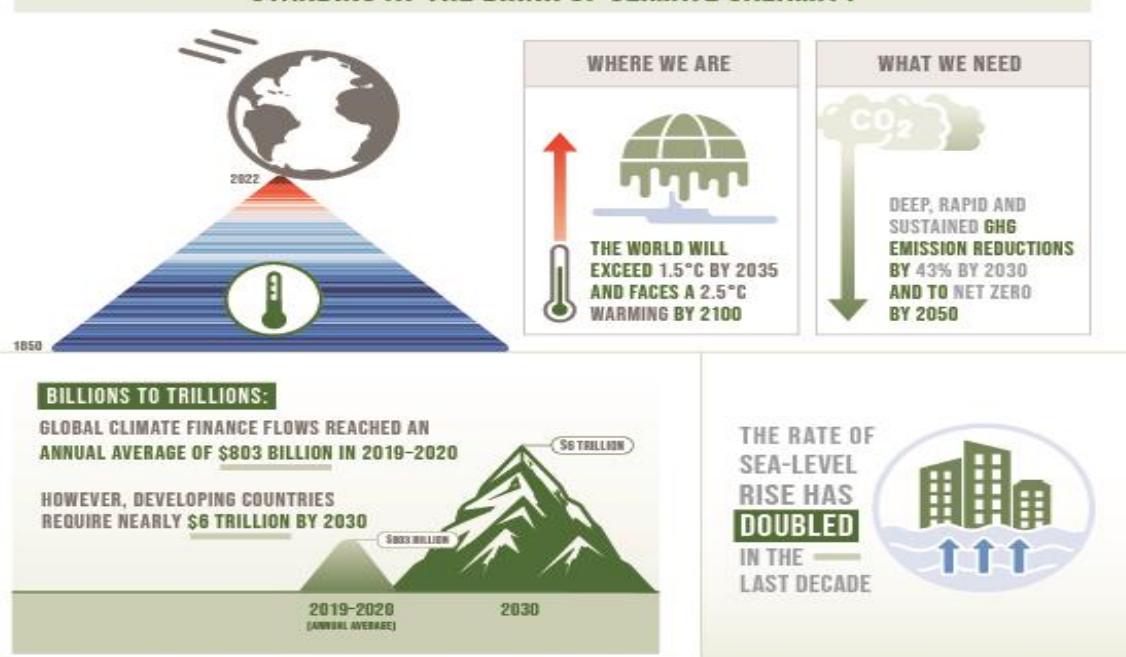
# 13. Climate Action



TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS

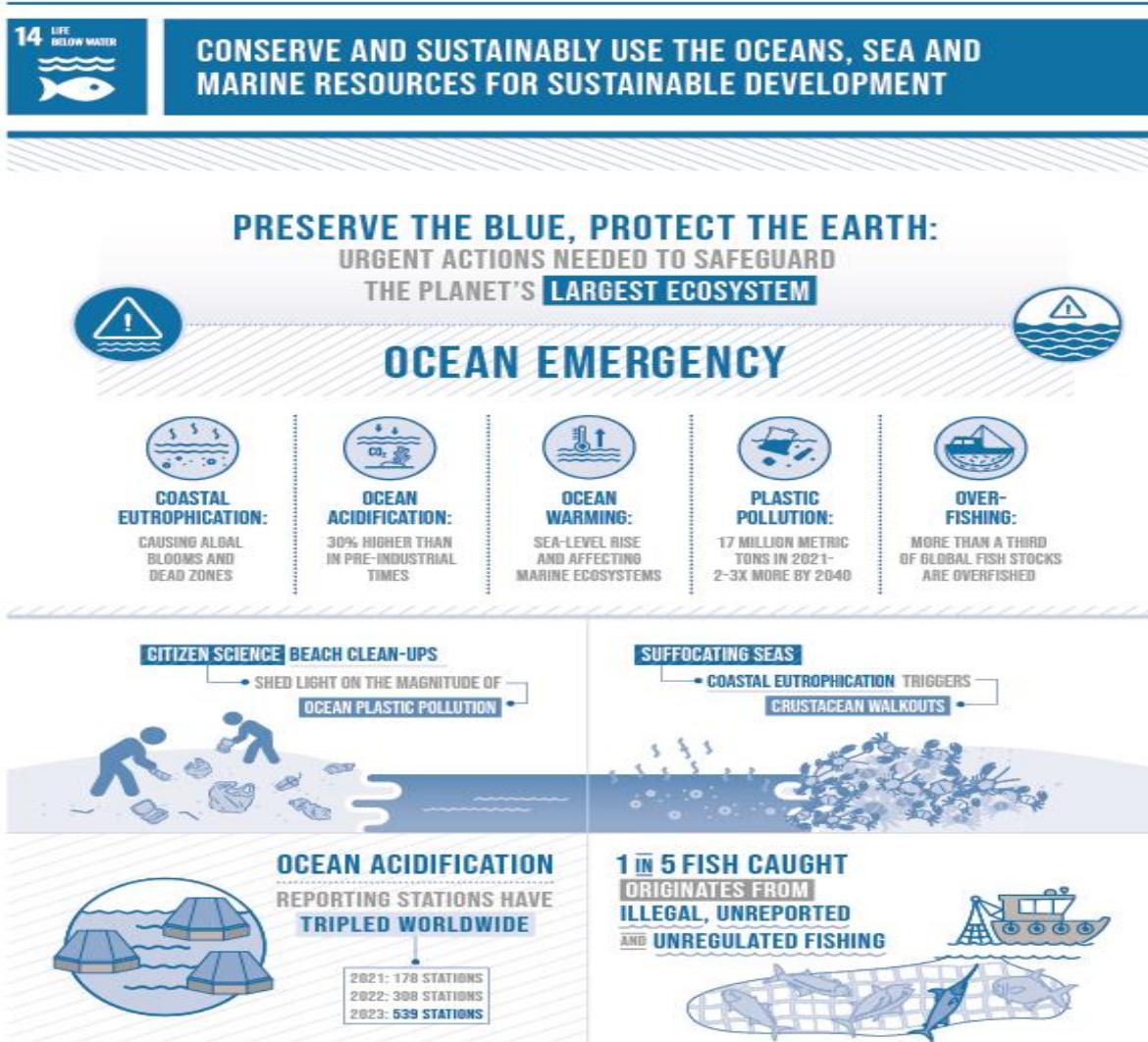
## EARTH'S TIPPING POINT

STANDING AT THE BRINK OF CLIMATE CALAMITY



- Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
- Integrate climate change measures into national policies, strategies and planning
- Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

# 14. Life Below Water



- By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.
- By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
- Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

# 15. Life on Land



- By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
- By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally
- By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

# 16. Peace, Justice and Strong Institutions



PROMOTE PEACEFUL AND INCLUSIVE SOCIETIES FOR SUSTAINABLE DEVELOPMENT, PROVIDE ACCESS TO JUSTICE FOR ALL AND BUILD EFFECTIVE, ACCOUNTABLE AND INCLUSIVE INSTITUTIONS AT ALL LEVELS

## STEEP RISE IN CONFLICT-RELATED CIVILIAN DEATHS



WITH AN OVER 50% SURGE IN 2022,  
FUELED BY THE WAR IN UKRAINE

2021 SAW

THE HIGHEST NUMBER OF  
INTENTIONAL HOMICIDES  
IN 20 YEARS

458,000 LIVES LOST

 9 IN 10 VICTIMS WERE MALE



MORE THAN  
**108.4 MILLION PEOPLE**  
HAD BEEN FORCIBLY DISPLACED  
WORLDWIDE AS OF END-2022  
2.5X THE NUMBER A DECADE AGO



NEARLY  
**200,000**

TRAFFICKING VICTIMS

WERE DETECTED WORLDWIDE  
BETWEEN 2017 AND 2020

BUT MANY MORE LIKELY  
REMAINED UNDETECTED

YOUTH FACE UNDERREPRESENTATION IN POLITICS,  
HINDERING THEIR PARTICIPATION IN DECISION-MAKING PROCESSES



**30**  
GLOBAL MEDIAN AGE



**51**  
AVERAGE AGE OF MEMBERS OF PARLIAMENT

- Significantly reduce all forms of violence and related death rates everywhere
- End abuse, exploitation, trafficking and all forms of violence against and torture of children
- Promote the rule of law at the national and international levels and ensure equal access to justice for all
- By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

# 17. Partnership

17 PARTNERSHIPS  
FOR THE GOALS

STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE  
THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

## MANY DEVELOPING COUNTRIES ARE FACING A DEBT CRISIS

AS OF NOVEMBER 2022,

89



37 OUT OF 69  
OF THE WORLD'S POOREST COUNTRIES  
WERE IN DEBT DISTRESS OR AT HIGH RISK OF IT

THE SHARE OF EXPORTS FROM  
LDCS IN GLOBAL  
MERCANDISE TRADE



HAS STAGNATED  
AT AROUND  
1%

SINCE 2011

NET ODA REACHED \$206 BILLION IN 2022, UP 15.3% FROM 2021

MAINLY OWING TO SPENDING ON REFUGEES  
IN DONOR COUNTRIES AND AID TO UKRAINE

NET ODA REACHED 0.37% OF GNI,  
STILL BELOW THE TARGET OF 0.7%



2 IN 3 PEOPLE  
USED THE INTERNET  
IN 2022  
259 MILLION MORE MALE THAN FEMALE USERS

## ODA FUNDING FOR DATA



- Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection.
- Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection
- Mobilize additional financial resources for developing countries from multiple sources
- Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring.

# INNOVATION IN A CONTEXT OF BUSINESS

- In a business context, *innovation is the ability to conceive, develop, deliver, and scale new products, services, processes, and business models for customers.*
  
- Successful innovation delivers net new growth that is substantial.

# PRODUCT INNOVATION EXAMPLES

- Product innovation *involves the development of a new product or the enhancement of an existing one*, strategically crafted to address *customers' needs* in a unique and innovative manner.
- Successful Innovative Products Examples include the *introduction of electric cars, smart home technologies, or advancements in medical devices*.
- The process of product innovation *involves generating and exploring ideas that challenge the status quo, encouraging creativity and the discovery of solutions* that have the potential to revolutionize industries and capture the imagination of consumers.

# PRODUCT INNOVATION EXAMPLES

- **Apple Company**

- Despite not being the initial creator of touchscreen devices.
- Apple's distinctive edge lay in its meticulous *attention to user interface (UI) and user experience (UX), creating devices that were not only accessible but also garnered a dedicated following.*
- The *introduction of the iPhone, with its seamless touch interface and intuitive design, set a new standard for the entire smartphone industry.*



# PRODUCT INNOVATION EXAMPLES

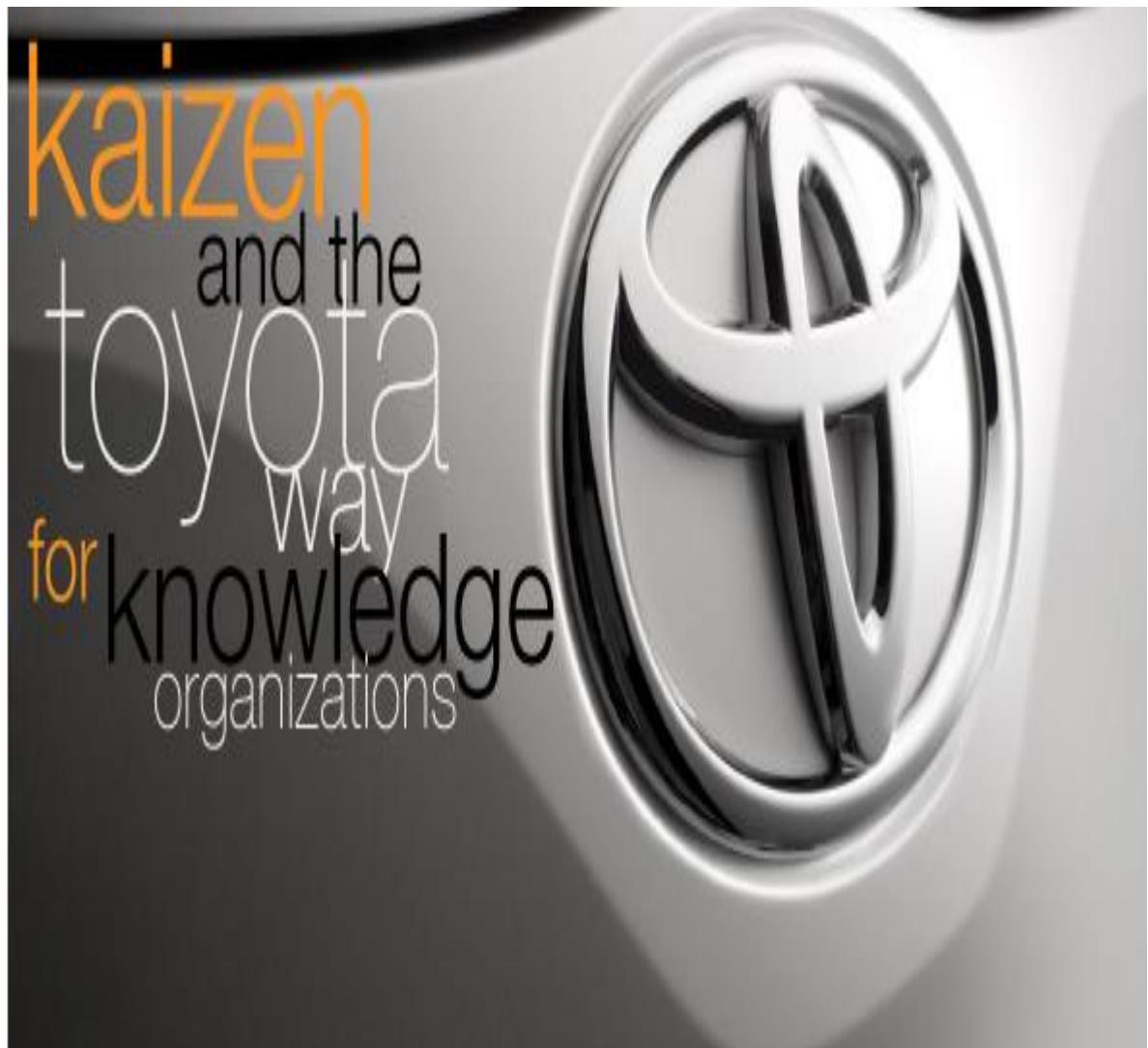
## • Ikea Product Innovation

- Ikea the global furniture giant revolutionized the furniture industry by selling innovative products in a 'flat-pack' format.
- This not only improved the convenience and logistics of furniture purchasing but also positioned Ikea as the go-to brand for value furniture.
- Customers could now transport and assemble furniture easily, reducing costs and enhancing the overall customer experience
- Ikea's approach transformed the way people buy and assemble furniture, setting a benchmark for the industry.



# PRODUCT INNOVATION EXAMPLES

- **Toyota Product Innovation**
  - Toyota company renowned Japanese automotive manufacturer, has embraced a continuous improvement philosophy known as kaizen.
  - Instead of pursuing risky radical transformations, Toyota focuses on core developments that compound over time.
  - This approach has allowed Toyota to stay at the forefront of the automotive industry, introducing incremental innovations in manufacturing processes, fuel efficiency, and vehicle safety.



# PRODUCT INNOVATION EXAMPLES

- **Tesla Product Innovation**

- Tesla's impact on the automotive industry is profound, stemming from a combination of groundbreaking innovations.
- At the core of their success is the introduction of electric vehicles (EVs) that transcend traditional automotive norms.
- Tesla's commitment to sustainability is evident in its battery technology, notably produced at the Gigafactory, which not only enhances the efficiency of EVs but also lowers overall production costs.



# Process Innovation

- Process Innovation involves *creating and implementing new or improved processes with enhanced capabilities, functionalities, or efficiencies.*
- It focuses on finding better ways to do things, offering useful improvements over previous methods.

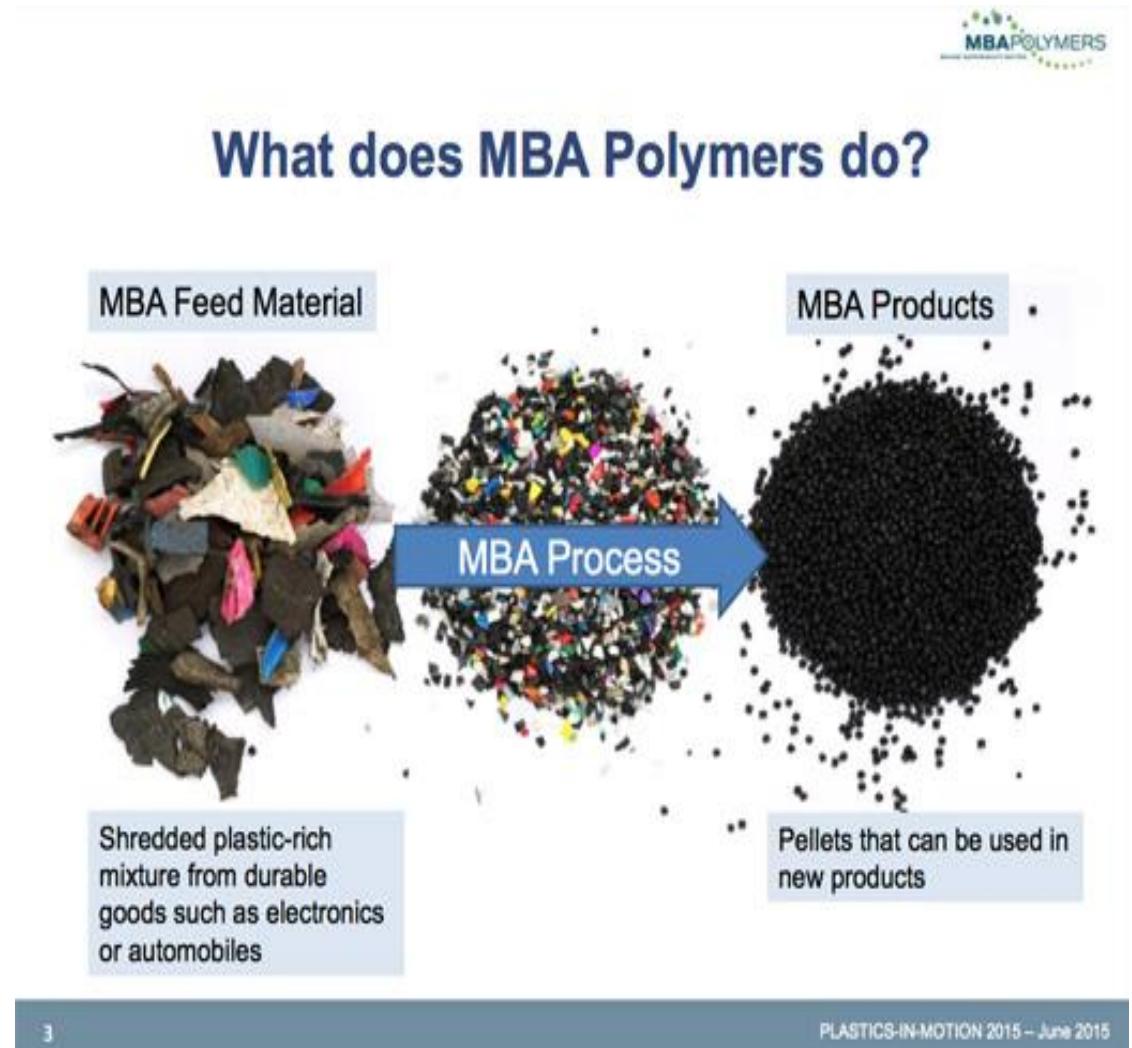
# Process Innovation

- Ford Assembly Line Process Innovation
  - An example of process innovation is the *Ford automated assembly line*.
  - In 1913, Henry Ford introduced the pioneering concept of an assembly line to enhance automobile production.
  - Through innovative practices, Ford successfully slashed the time required to manufacture a car from 12 hours to an astonishingly efficient less than 2 hours.
  - Beyond the assembly line, Ford has continued to innovate, incorporating automation, advanced materials, and digital technologies into its manufacturing processes.



# Process Innovation

- **MBA Polymers Process Innovation**
- MBA Polymers is an industry leader in plastic recycling, innovating through advanced sorting and separation technologies.
- Their automated systems efficiently extract high-quality plastics from complex waste streams, including electronic waste.
- This process results in recycled plastics with properties comparable to virgin materials, reducing environmental impact and promoting a circular economy.
- MBA Polymers' continuous investment in research and development ensures ongoing improvement and adaptability to global waste challenges.



# Process Innovation

## • Starbucks Process Innovation

- Starbucks has revolutionized the coffee industry through pioneering process innovations that prioritize efficiency and customer satisfaction.
- Their commitment to a seamless and customer-centric ordering and fulfilment process stands out prominently.
- Leveraging cutting-edge digital technology, Starbucks has introduced mobile ordering systems, allowing customers to place orders and make payments conveniently through their smartphones.
- This not only streamlines the purchasing process but also enhances overall efficiency.

## Starbucks Business Model Innovation

Office Space BMI: Becoming the "Second Place"



# Business model innovation

- **Business model innovation** empowers companies to distinguish themselves from competitors through the provision of distinctive value propositions, exploration of uncharted market segments, or harnessing emerging technological advancements.
- This strategic approach not only facilitates the attainment of a **competitive advantage** but also ensures that businesses remain at the forefront of the market.

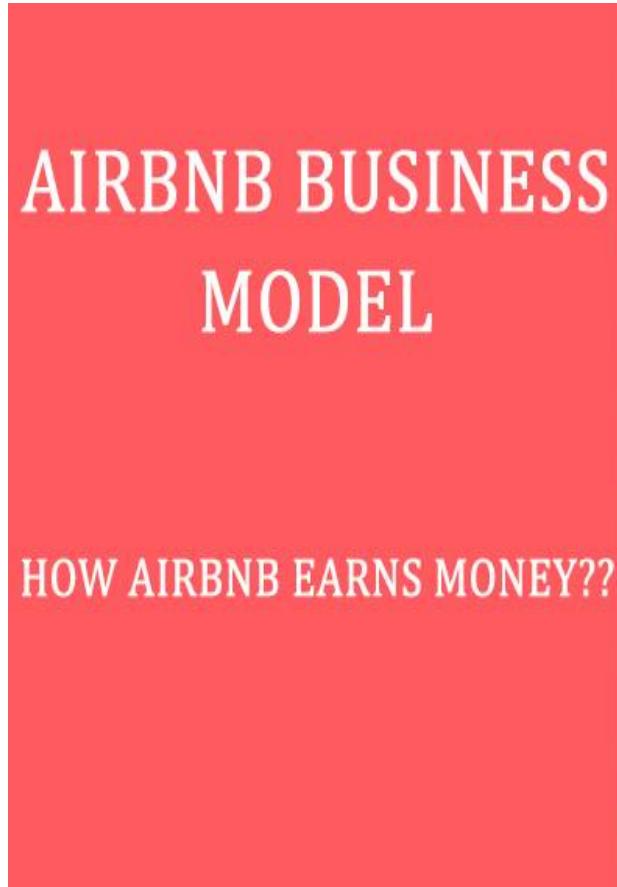
# Business model innovation

- **Airbnb Business Model Innovation**

➤ Airbnb's impact on hospitality goes beyond its *peer-to-peer model, relying on process innovations.*

➤ User-generated reviews build trust, enhancing host accountability. “Instant Booking” streamlines reservations, catering to immediate needs. Safety initiatives like the Host Guarantee and dynamic pricing show commitment.

➤ Diversification with “*Experiences*” and “*Airbnb Plus*” enhances offerings. A community-centered approach fosters direct communication among hosts.



# Business model innovation

- **Spotify Business Model Innovation:**

- Spotify's free premium model offers features such as personalized playlists and recommendations based on individual listening habits.
- This enhances the overall user experience and encourages users to explore premium features for an even more tailored and enjoyable music streaming experience.
- It strategically expanded its content offering beyond music to include podcasts, diversifying its platform and attracting a broader audience



# Innovation in Engineering and Computer science (Technology)

- **Technology Innovation** is about creating or improving technologies for enhanced capabilities.
- It requires substantial investment in research and development, adaptability to market trends, and a focus on delivering value.
- Success hinges on effective management of intellectual property, talent, and partnerships.
- Technological Innovation focus on **value creation** is what drives the adoption of new technologies and positions them as drivers of progress.

# Innovation in Engineering and Computer science

- Mobile Technology and Smartphones:
- The advent of mobile technology, particularly smartphones, has revolutionized communication, entertainment, and productivity.
- Smartphones are not merely devices for making calls; they serve as portable computers with features like high-quality cameras, powerful processors, and a myriad of applications that have transformed how individuals access information and connect with the world.



# Innovation in Engineering and Computer science

- **Electric Vehicles (EVs) Technological Innovation**

- Electric Vehicles (EVs) stand as a pinnacle of technological innovation within the automotive sector, ushering in a transformative era for transportation.
- Key advancements in battery technology, notably the adoption of lithium-ion batteries, play a crucial role in extending driving ranges and minimizing charging times.
- Complementing these innovations are regenerative braking systems that enhance energy efficiency, and the integration of electric motors like Permanent Magnet Synchronous Motors, ensuring superior performance.
  - Battery Management Systems
  - autonomous driving features and connectivity
  - heightening safety and operational efficiency.



# Innovation in Engineering and Computer science

- **Information Technology (IT) Innovation**
- Innovative solutions continually redefine how businesses operate and interact with the digital realm.
- Here are two compelling examples that showcase the transformative power of IT innovation:
  - **Artificial Intelligence (AI):**
  - **Internet of Things (IoT):**
  - Cloud Computing



# Information Technology (IT) Innovation

- **Artificial Intelligence (AI):**

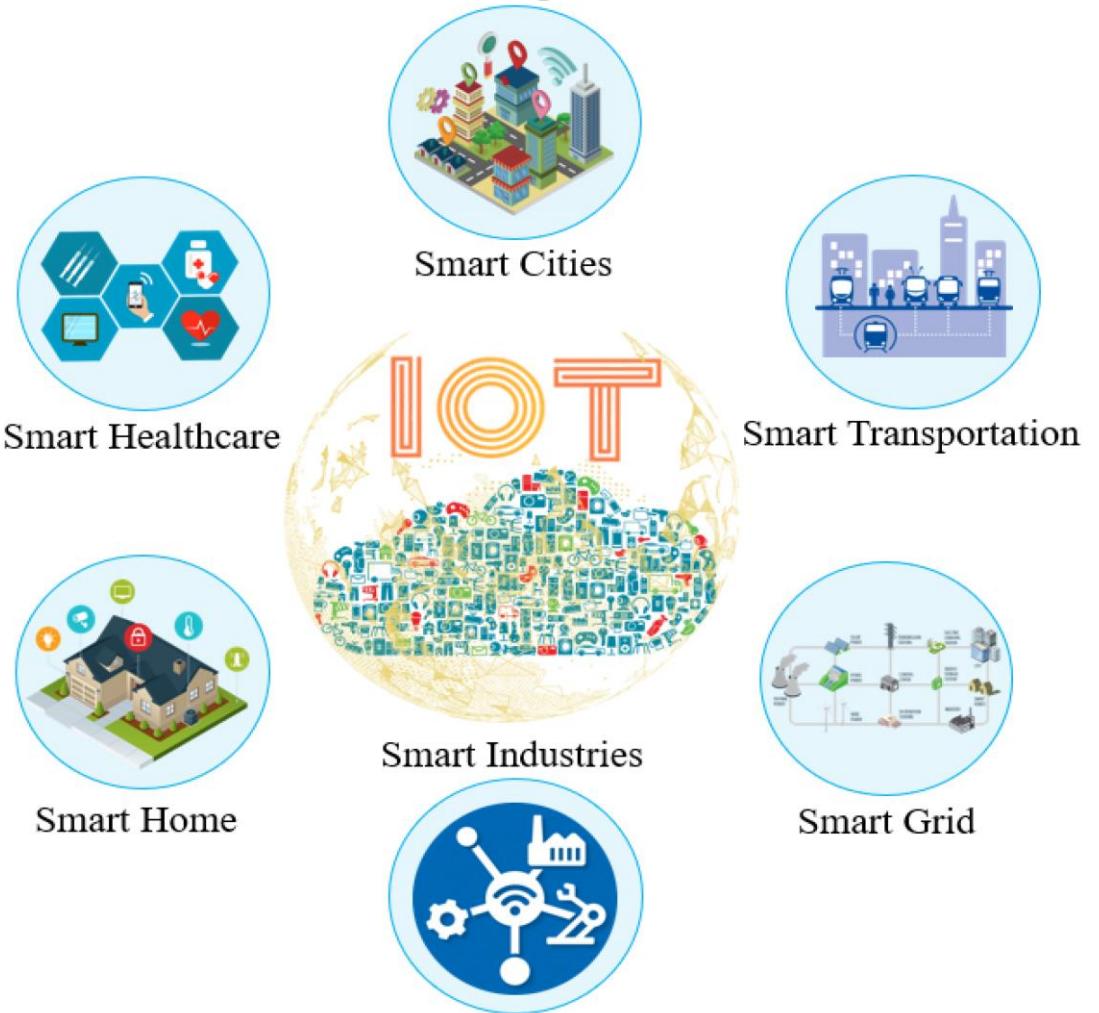
- AI involves the *development of computer systems that can perform tasks that typically require human intelligence.*
- *Machine learning, a subset of AI, enables systems to learn and improve from experience.*
- AI is applied in various domains, *including natural language processing, image recognition, and autonomous systems.*
- Companies use AI to *enhance customer experiences, optimize operations, and drive innovation in products and services.*



# Information Technology (IT) Innovation

- **Internet of Things (IoT):**

- IoT refers to the interconnectivity of everyday devices, enabling them to send and receive data.
- This interconnected network allows for real-time monitoring, analysis, and control of devices.
- In the home, IoT devices include smart thermostats, security cameras, and wearable devices.
- In industries, IoT is used for predictive maintenance, supply chain optimization, and more.

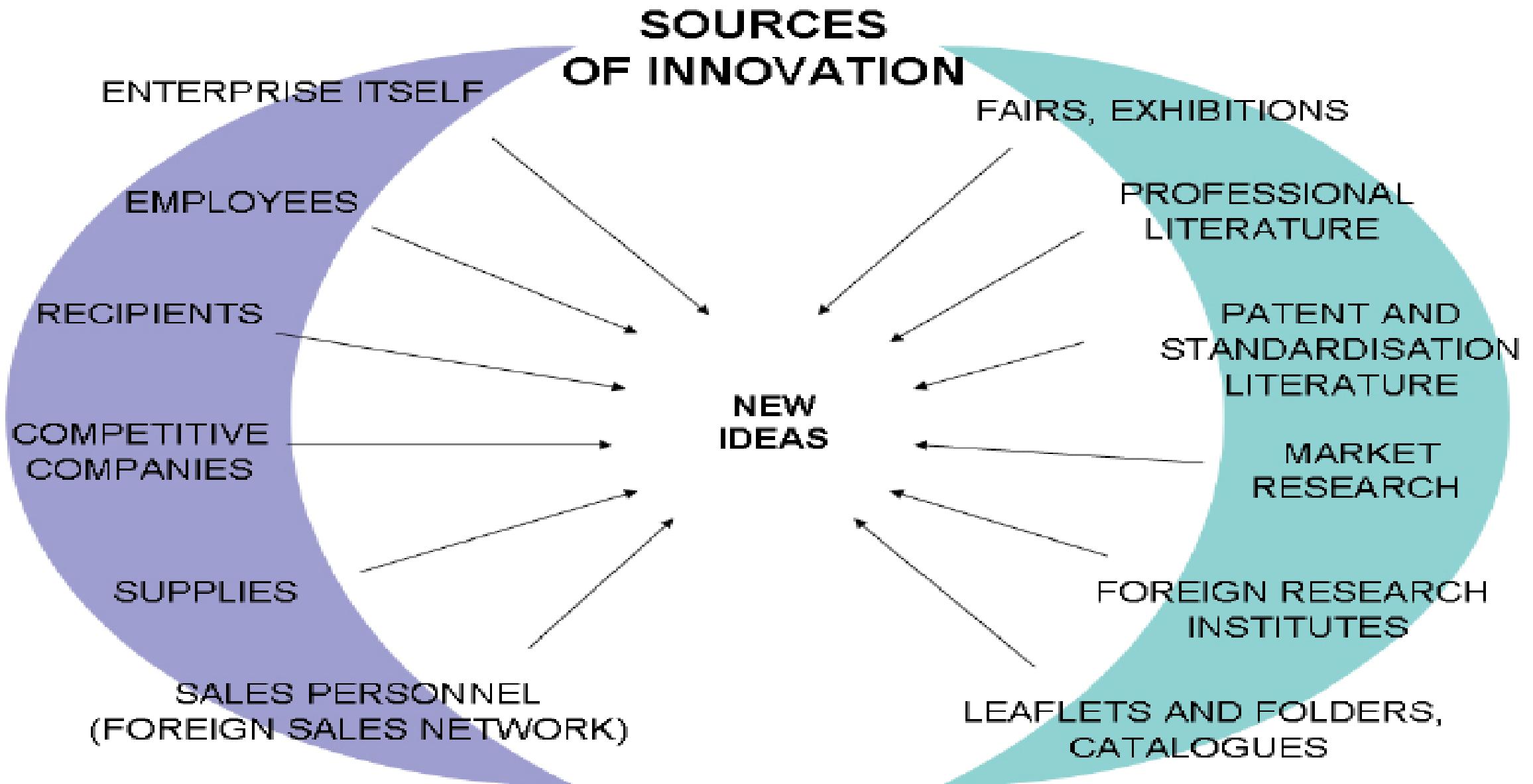


# Information Technology (IT) Innovation

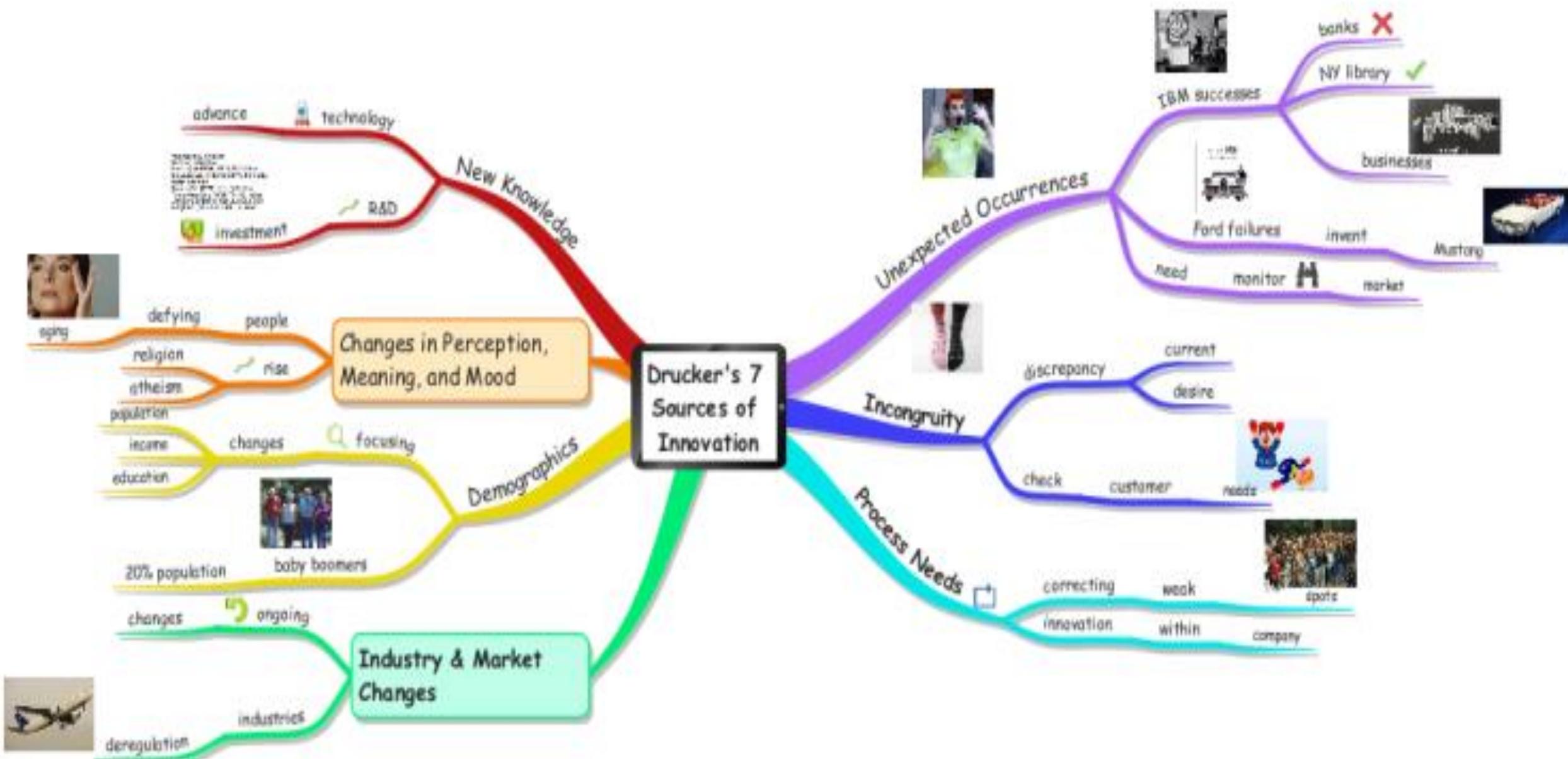
- **Cloud Computing:**
- Cloud computing has transformed the way businesses store, process, and access data.
- Instead of relying on physical servers, cloud computing provides on-demand access to computing resources, allowing organizations to scale operations seamlessly.
- It has facilitated innovations such as Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS).



# SOURCES OF INNOVATION



# SOURCES OF INNOVATION



# Knowledge Push Invention

- Knowledge Push is *an approach to innovation that emphasizes the push of existing knowledge or technology into the development of new products or services.*
- In this approach, *innovation originates from research findings, discoveries, or advancements in science or technology that create new possibilities or solutions.*
- For example,
- the invention of the transistor in 1947 enabled the development of *various electronic devices, such as radios, computers, and mobile phones.*
- The *discovery of penicillin* in 1928 led to the creation of antibiotics that revolutionized medicine.
- The advancement of biotechnology in the 1970s opened up new opportunities for *genetic engineering and cloning.*

# Knowledge Push Invention

- Knowledge Push is often associated with scientific or technological breakthroughs that result from curiosity-driven research or experimentation.
- Organizations that adopt this approach tend to invest heavily in research and development (R&D) and have strong capabilities in science or engineering.
- However, Knowledge Push also involves some challenges and risks. One of the challenges is to identify and understand the market needs or customer problems that can be solved by the new knowledge or technology.
- Another challenge is to translate the knowledge or technology into practical and usable products or services that can be marketed effectively.

# Knowledge Push Invention

- **Google Glass:**

- Google Glass is a wearable device that displays information on a small screen in front of the user's eye.
- It was developed by Google X, a research lab that focuses on breakthrough technologies.
- Google Glass was based on existing technologies such as augmented reality, voice recognition, and wireless communication.



# Knowledge Push Invention

- **Post-it Notes**

- Post-it Notes are sticky notes that can be easily attached and removed from surfaces.
- They were invented by Spencer Silver and Arthur Fry, two scientists at 3M, a company known for its innovation culture.
- Post-it Notes were based on existing technology of pressure-sensitive adhesive.



# Knowledge Push Invention

- **Dyson Vacuum Cleaner**
- Dyson Vacuum Cleaner is a household appliance that uses cyclone technology to separate dust and dirt from air.
- It was invented by James Dyson, an industrial designer who was dissatisfied with conventional vacuum cleaners.
- Dyson Vacuum Cleaner was based on existing knowledge of fluid dynamics and engineering.



# NEED PULL INNOVATION

- Need Pull is an approach to innovation that emphasizes the **development of products or services based on existing market demand or customer needs.**
- In this approach, **innovation starts with an understanding of what the market or customers want, need, or expect,** and then organizations seek ways to fulfill those needs.
- **For example,**
  - the **development of smartphones** was driven by the market demand for mobile devices that can perform multiple functions, such as communication, entertainment, and information.
  - The **development of online shopping** was driven by the customer need for convenience, variety, and lower prices.
  - The **development of electric cars** was driven by the customer expectation for environmental sustainability and energy efficiency.

# NEED PULL INNOVATION

- Need Pull is often associated with market-driven or customer-centric innovation that results from market research, trend analysis, or customer feedback.
- Organizations that adopt this approach tend to invest heavily in marketing and sales and have strong capabilities in design or service.
- However, Need Pull also involves some challenges and risks.
  - One of the challenges is to differentiate their products or services from competitors who may offer similar solutions to the same market needs or customer problems.
  - Another challenge is to anticipate and respond to changing market needs or customer preferences.
- One of the risks is that not all market needs or customer problems are clearly articulated or expressed by customers themselves.
- Some innovations may require creating new needs or expectations that customers are not aware of or do not value yet.
- This can result in low adoption rates or customer satisfaction.

# NEED PULL INNOVATION

- **Netflix**
- Netflix is an online streaming service that provides movies and TV shows on demand.
- It was founded by Reed Hastings and Marc Randolph, two entrepreneurs who saw an opportunity in the video rental market.
- Netflix was based on existing market demand for convenience, selection, and personalization.



# NEED PULL INNOVATION

- **IKEA**

- IKEA is a furniture retailer that offers affordable, stylish, and functional products.
- It was founded by Ingvar Kamprad, a young entrepreneur who saw a need for low-cost furniture in post-war Sweden.
- IKEA was based on existing customer need for quality, design, and value.



# NEED PULL INNOVATION

- **Uber**
- Uber is a ride-hailing service that connects drivers and passengers via a mobile app.
- It was founded by Travis Kalanick and Garrett Camp, two entrepreneurs who experienced the problem of finding a taxi in San Francisco.
- Uber was based on existing customer problem of transportation, convenience, and cost.



## KNOWLEDGE PUSH VS. NEED PULL INNOVATIONS

- The main difference between Knowledge Push and Need Pull is the primary source of innovation.
- *Knowledge Push relies on existing knowledge or technology, while Need Pull relies on existing market demand or needs.*
- Some organizations may combine both approaches to achieve optimal innovation success.

# TYPES OF INNOVATION

- Incremental Innovation
- Disruptive Innovation
- Radical Innovation
- Open Innovation
- Juggad Innovation

# TYPES OF INNOVATION

- **Incremental innovation:**

- Incremental innovation involves making *small improvements to existing products, processes, or services.*
- It is often characterized by *gradual enhancements and optimizations.*
- A continuous flow of incremental innovation is needed *to keep a business relevant and up to date.*

**Example:**

- An example might be a new model year release.
- Regular updates to smartphone models with improved features or performance represent incremental innovation.

# TYPES OF INNOVATION

- **Disruptive innovation:**

- “A major change or breakthrough that creates a new market that eventually replaces the existing market”.
- Disruptive innovations start off targeting a new lower-end market but eventually increase in quality to replace, or disrupt, demand in the existing market.
- For example,
- Netflix and other video streaming sites started as a lower ***cost option to buying DVDs, but eventually increased in convenience and value to the point that it has almost replaced DVD sales entirely*** in the market for home movie watching.
- The introduction of *digital cameras disrupted the traditional film photography* industry.

# TYPES OF INNOVATION

## Radical innovation:

- Radical innovation is *an invention that destroys or supplants an existing business model.*
- Radical innovation *brings about transformative changes in how we live or how businesses operate.*
- Embracing radical innovation *allows companies to establish themselves as pioneers in innovation, trendsetters, and influencers in the market,* providing them with *significant competitive advantages over less innovative counterparts.*
- Radical innovations are *high-risk and high-reward endeavors, Requires large amount of investments* and *May face Resistance from existing players.*
- They *create entirely new markets*, so companies that develop them can be unmatched for a long time in a market as others try to play catch-up.
- Conversely, *they often rely on untested ideas* so they *might fail entirely if no market is found.*
- Because of this, *some companies might be wary of radical innovations* and tend to shy away from them in favor of safer, incremental advancement.

# TYPES OF INNOVATION

- **Radical innovation Examples:**

- Personal computers-Apple, IBM and Microsoft Corporations
- Cloud computing-Amazon web services, Microsoft Azure, Google cloud platform
- Washing Machines
- Block chain Technology
- 3D Printing Technology

## RADICAL INNOVATION VS DISRUPTIVE INNOVATION

- Although both are transformative, disruptive innovation aims to replace existing solutions in the market, causing a significant shift. On the other hand,
- **radical innovation** introduces entirely new concepts that may coexist or eventually replace current solutions.
- The advent of digital streaming services, such as Netflix, is a testament to disruptive innovation, reshaping the entertainment industry,
- while the introduction of smartphones represents **radical innovation** by creating a new category of devices.

# RADICAL INNOVATION VS DISRUPTIVE INNOVATION

Aspect	Radical Innovation	Disruptive Innovation
Definition	Requires a high level of adaptability to embrace transformative change.	Introduces new products or services that disrupt existing markets, often targeting underserved or overlooked segments.
Scope of Change	Broad and transformative, impacting various aspects of an industry or market.	Specifically aimed at disrupting existing markets or industries, challenging established players.
Level of Disruption	Can be highly disruptive, especially if it introduces a completely new paradigm.	Intentionally disruptive, aiming to create a shift in market dynamics and hierarchies.
Risk and Investment	Involves a higher level of risk and investment due to the uncertainty of introducing something entirely new.	Requires significant risk-taking, but the focus is often on creating a more cost-effective solution for underserved markets.
Timeline and Pace	May have a longer timeline for research, development, and market adoption.	Can have a quicker pace of adoption, especially if it offers a simpler, more accessible solution than existing options.
Examples	The development of the internet, smartphones, electric cars.	Requires a high level of adaptability to embrace transformative change.
Market Impact	Creates new markets and redefines industries, potentially rendering existing technologies obsolete.	Targets existing markets but with the goal of redefining how products or services are delivered.
Adaptability and Flexibility	Requires a high level of adaptability to embrace the transformative change.	Requires adaptability but often in response to market shifts caused by disruptive innovations.
Long-Term vs. Short-Term Focus	Often has a long-term focus, establishing new directions for industries.	May have both short-term and long-term effects, but the initial focus is on market disruption.

# TYPES OF INNOVATION

- **Open Innovation:**
- **Description:** Open innovation involves collaboration with external partners, including customers, suppliers, and other organizations, to generate ideas, share knowledge, and co-create value.
- It extends innovation beyond internal boundaries.
- **Example:** Companies like Procter & Gamble (P&G) engage in open innovation by collaborating with external partners for product development.

# JUGAAD INNOVATION

- Improvisations with limited resources
- Adaptability & Inclusivity Mindset, Frugal & Collaborative approach
- Three core aspects
  - Faster
    - No linear/structured, pre-planned, detailed R&D processes
    - Rely majorly on rapid prototyping techniques
    - Collaborate closely with customers and use their constant feedback to develop relevant product features (“Co-creation”)
  - Cheaper
    - Reuse of existing infrastructure and assets in innovative ways
  - Better
    - Improved quality products for low-income groups

# Innovative and cost-efficient jugaads

- In India, waterlogged roads and floods are common. Especially in rural areas, during the rainy season, the movement of people gets restricted.
- To help people walk on water during floods, Dwarka Prasad Chaurasia—reportedly now in his 90s— invented "Water Walking Shoes" in the 1980s.
- The shoes—comprising two thermocol floats attached to a rexine fabric—are so useful that people use them during floods even today.



# JUGAAD INNOVATION

- **Innovative washing cum exercise machine**
- Washing machines are a luxury not everyone can afford, especially in India. However, washing clothes manually can be a lot of work and tiresome too.
- Remya Jose, hailing from Kerala's Malappuram, who was tired of washing clothes manually, decided to come up with an economical solution.
- She created a washing-cum-exercise machine with a cycle that washes clothes only after three-four minutes of pedaling.



# JUGAAD INNOVATION

- **Low-cost, no-fuel plow created from old bicycle**

In 2016, Ram Prasad, a farmer in Uttar Pradesh's Banda, converted an old cycle into a low-cost, no-fuel plow.

He came up with the idea when he had to sell his bullock during a drought year; he had no money to maintain tractors and equipment for plowing.

After experimenting for years, he finally built the no-fuel plow with a single-wheel, front/rear handles, and diggers..



# JUGAAD INNOVATION

- **Making multi-purpose ropes from old sarees**
- Making multi-purpose ropes from old sarees is one of the most common *jugaads*.
- Some people have even built simple rope-makers to braid and twine *saree* (cloth) strips to make long ropes.
- These ropes are quite strong and can be used for various purposes.



**Making Rope using sari**

# JUGAAD INNOVATION

- A Recycled Scooter
- Jharkhand farmer uses second-hand scooter as an affordable replacement for a tractor, to work in his field.



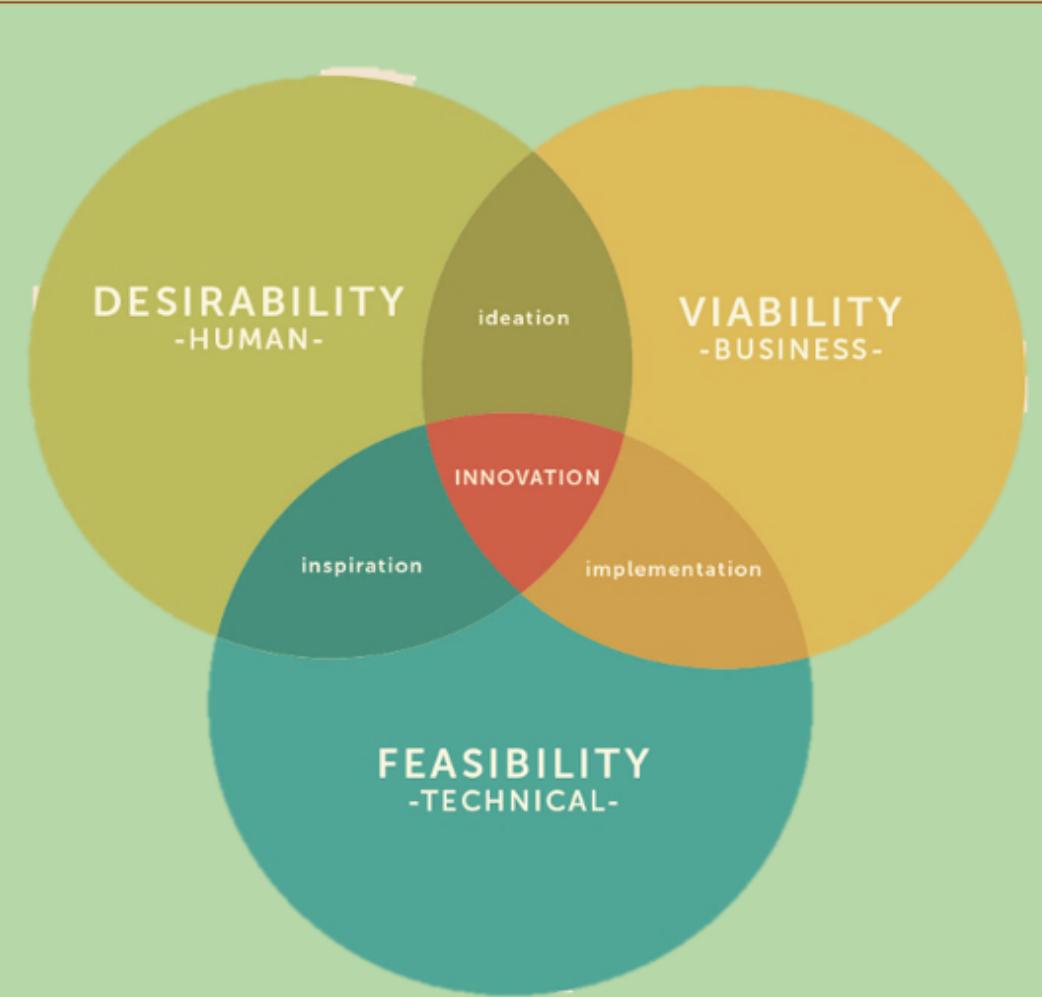
# JUGAAD INNOVATION

- Social Distancing Bike
- A man in Agartala designed an electric motorcycle to highlight the importance of social distancing.



# Collaborating for Innovation; Three lenses of innovation

## Innovation Space



- Identify pains, needs, and desires
- Create a feasible solution
- Start with the aim of satisfice  
→ Maximise the benefits  
(Utilitarianism)
- Create viability
  - Viable = able to live after birth  
(Oxford dictionary)
  - Core purpose of business is not to make money