Frontier Technologies

This article is based on **"The tech frontier for developing nations"** which was published in Livemint on 25/12/2019. It talks about the impact of Frontier Technologies on developing nations.

The rapid technological transformations that started from the **Industrial Revolution to the digital revolution,** have boosted economic performance, improved efficiency, accelerated the pace of globalization, and transformed human society in the process.

Frontier Technology or **Industrial Revolution 4.0,** the **latest wave of disruptive technological change** is fundamentally altering how goods, services and ideas are exchanged. However, the disruptive nature of technology is nothing new, and it offers promising new opportunities, while at the same time posing a challenge to policymaking.

Therefore, the frontier technologies demand renewed policy cooperation at all levels of governance (national, regional and global levels).

What are Frontier Technologies and their applications?

- Frontier technologies are defined as potentially disruptive technologies that can address large-scale challenges or opportunities. Frontier technology is the next phase in the evolution of modern technology. It is the intersection where radical forward-thinking and real-world implementation meet. For example **AI**, **robotics, 3D printing, and the Internet of Things, etc.**
- Frontier technologies have unlocked new routes to prosperity through agriculture, manufacturing, trade in services, the linking of informal and formal sectors, and domestic interconnectivity.
- They have enormous potential to improve government administration and the delivery of public services.

- They can help anticipate and respond to the effects of climate hazards and air pollution through the adoption of state-of-the-art technologies to address environmental impacts.
  - In the Republic of Korea, the smart city of Songdo is built around the Internet of Things to reduce traffic pollution, save energy and water, and create a cleaner environment.
- It will be critical that these technologies work for society and the environment as well as the economy if the world is to achieve the ambitions of the 2030 Agenda for Sustainable Development.

Associated Challenges

- **Digital Exclusion:**
  - As Information and Communication Technology infrastructure is the backbone of many frontier technologies, there is a risk of its triggering a new frontier technology divide, compounding an already existing digital divide.
  - An estimated **three billion people could still lack internet access by 2023**, and many more will have little or no opportunity to reap the benefits of digital technologies.
  - There is a danger that gains associated with frontier technologies will not reach the world's poorest people.
- **Uncertain Future of Work:**
  - In the coming decades, **the jobs of 785 million workers,** that's equivalent to over 50 % of total employment in the Asia-Pacific region could be automated.
- **Trust and Ethical Questions:**
  - Frontier Technology per se is not the problem, but there are ethical issues **surrounding privacy, ownership and transparency.**
  - With the world's population projected to reach ten billion by mid-century, global governance will become even more complex than it is today.
- **Developing countries,** in particular, are starting from a difficult position, because they are already grappling with the challenges of low human capital, ineffective institutions, and a difficult business environment.

Way Forward

The **Pathways for Prosperity Commission on Technology and Inclusive Development** has shown that developing countries can still harness the new wave of frontier technologies for the benefit of all.

In this context, a policy framework for the next generation of technology and innovation should focus on creating an enabling environment for frontier technologies to positively impact the economy, society, and environment; and to reduce inequalities.

This may require the development of:

- An inclusive ICT infrastructure.
- A workforce fit for the emerging scale and speed of the technological revolution.
    - In this context, there is a need to promote lifelong learning, reskilling and entrepreneurship development to develop a cadre of job creators.
- A policy framework to **strengthen public-private partnerships,** so as to capture the benefits of the Fourth Industrial Revolution.
- A responsive and adaptive regulatory framework that doesn't stifle innovation.
- **Whole-of-economy or Most-of-society approach:** Technology alone will not guarantee success. Policymakers must also account for local contexts and conditions so that they can create social, political and economic ecosystems in which technology creates jobs and drives inclusive growth.
- **Investment in technical pillars of the future economy:**
    - National governments should start planning for digital readiness in four areas: infrastructure, human capital, policy and regulation, and finance.

Drishti Mains Question

Analyse the possible impact of frontier technologies on developing countries.