



DEVELOPMENT AND TRANSFER OF SCIENCE AND TECHNOLOGY IN THE GLOBAL SOUTH

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ABSTRACT:

This paper examines the pathways and challenges associated with the development and transfer of science and technology in the global South. It highlights key issues such as access to technology, capacity, building and the role of international partnership. Today in artificial intelligence is also play a very effective role in global extent. Field of computer science also focuses on developing machines and computers that can learn, reason and act in ways that would normally require human intelligence. It analyses large amount of data to identify patterns and relationship with other countries.

Limited access to funding, research infrastructure, and skilled human capital often means that many countries in the Global South cannot effectively develop or apply cutting-edge technologies. Lack of robust educational systems and skilled labor in fields such as engineering, biotechnology, and information technology limits the ability to innovate locally. The global system of intellectual property rights, largely controlled by developed countries and corporations, often limits the ability of countries in the Global South to freely use and adapt new technologies. Many talented researchers and scientists from the Global South migrate to developed countries in search of better opportunities, leading to a "brain drain" that undermines local scientific and technological capabilities. Many regions in the Global South face challenges with basic infrastructure, such as access to electricity, internet connectivity, and research facilities, which are essential for effective S&T development.

KEYWORDS:

GLOBAL SOUTH, ARTIFICIAL INTELLIGENCE, INTELLECTUAL PROPERTY RIGHTS, BRAIN DRAIN, DEVELOPING COUNTRIES.

KEY PARTS OF SCIENCE AND INNOVATION MOVE

ADVANCEMENT LIMIT BUILDING:

Instruction and Abilities Improvement: One of the main parts of innovation move is building the human resources important to retain and apply cutting edge innovations. This includes preparing researchers, architects, and professionals in neighborhood settings, guaranteeing they have the right stuff to adjust and improve in light of nearby necessities.

Innovative work (Research and development) Framework: Numerous nations in the Worldwide South face difficulties connected with lacking foundation for excellent examination. Fortifying examination establishments and giving admittance to cutting edge labs, gear, and innovation are principal steps.

STRATEGY AND ADMINISTRATION STRUCTURES:

Licensed innovation Privileges (IPR): One of the hindrances to innovation move is the perplexing scene of protected innovation. Agricultural nations might come up short on ability to explore IPR regulations or may not profit from worldwide IP frameworks that focus on the interests of created nations. There is expanding promotion for re-examining global patent and intellectual property regulations to make them more comprehensive and impartial.

Innovation Move Arrangements: Emerging nations frequently go into innovation move concurrences with created nations or global partnerships. Be that as it may, these arrangements may not generally be impartial, at times bringing about the double-dealing of neighborhood assets or making reliance on unfamiliar innovation. Arranging more pleasant terms and guaranteeing innovation is adjusted to nearby settings is significant.

Administration and Guideline: Viable administration structures at the public level, including the execution of strategies that advance development and safeguard home grown enterprises, assume a key part in working with effective innovation move. This incorporates the improvement of public advancement arrangements, innovation parks, and science bunches that help nearby business visionaries.

AREAS OF CONCENTRATION FOR INNOVATION MOVE:

Horticulture and Food Security: Developments in agribusiness, for example, dry spell safe harvests, accuracy cultivating strategies, and new techniques for water system, can altogether help food creation and security in the Worldwide South. A large number of these developments can be moved through worldwide farming

associations and nearby organizations.

Wellbeing and Medication: The Worldwide South faces numerous wellbeing challenges, from irresistible sicknesses like jungle fever and HIV/Helps to arising wellbeing emergencies. Innovation move in the wellbeing area includes clinical gadgets and drugs as well as general wellbeing practices and information move around illness anticipation and treatment.

Environmentally friendly power and Environmental Change: Admittance to spotless and sustainable power is fundamental for feasible turn of events. Sun powered, wind, and different types of sustainable power advances have been generally scattered in the Worldwide South, with organizations and legislatures in the Worldwide North assuming a part in working with these exchanges.

Advanced Innovations: The ascent of data and correspondence advances (ICT) has opened up new open doors for the Worldwide South in areas like schooling, medical care, web based business, and administration. Computerized stages and versatile advances are progressively used to address improvement challenges, and their reception is basic for the computerized consideration of these nations.

CHALLENGES IN INNOVATION MOVE:

Absence of Foundation and Venture: Satisfactory actual framework (e.g., streets, power lattices) and institutional help are frequently deficient with regards to, making it challenging for nations in the Worldwide South to take advantage of moved advancements completely.

Social and Relevant Contrasts: Advances created in one setting may not generally be appropriate or effectively versatile to one more due to social, natural, or financial contrasts. Successful innovation move requires grasping these distinctions and altering arrangements likewise.

Monetary Limitations: Even with the right information and framework, monetary assets are many times a restricting element in the reception of trend setting innovations. State run administrations and global associations should cooperate to increment financing for advancement and the scaling of advancements in creating areas.

WORLDWIDE JOINT EFFORT AND ORGANIZATIONS:

Multilateral associations like the Assembled Countries (UN), World Bank, World Licensed innovation Association (WIPO), and local bodies like the African Association (AU) and ASEAN are fundamental for encouraging global collaboration in science and innovation. These bodies can assume key parts in making systems for coordinated effort, setting worldwide standards, and guaranteeing that innovation move benefits are fair.

Non-administrative associations (NGOs) and confidential area drives additionally assume basic parts in giving the monetary and specialized help required for innovation move to prevail in the Worldwide South.

THE JOB OF COMMON SOCIETY AND SOCIAL DEVELOPMENTS:

Common society associations and grassroots developments in the Worldwide South can likewise advocate for more pleasant innovation move and guarantee that advancements line up with the necessities of neighborhood networks. Social developments connected with environmental change, wellbeing value, and food powers are progressively associated with forming the discussion around innovation move.

GLOBAL INNOVATION ECOSYSTEM:

Collaboration and Networks: The global innovation ecosystem thrives on collaboration between countries, research institutions, universities, and businesses. Cross-border research, shared data, and multinational projects have become the norm. Examples include the European Union's Horizon Europe program, the International Space Station (ISS) partnership, and the World Health Organization's (WHO) collaborative efforts on pandemic response.

Knowledge Exchange and Open Science: The rise of open-access publications, open-source software, and global research databases (such as those shared by the UN and the World Bank) has made it easier for researchers to access the latest scientific findings, accelerating progress across disciplines. Initiatives like the Open Science movement aim to break down barriers to knowledge sharing, allowing for faster dissemination and application of scientific results globally.

DIGITAL TRANSFORMATION AND TECHNOLOGY AS A DRIVER OF INNOVATION:

Artificial Intelligence (AI) and Machine Learning: AI and machine learning have revolutionized many sectors, from healthcare (e.g., disease diagnosis, drug discovery) to agriculture (e.g., precision farming) and climate science (e.g., weather prediction, environmental monitoring). These technologies are advancing globally, though their impact varies depending on local contexts, regulations, and infrastructure.

Internet of Things (IoT): IoT, which connects everyday devices to the internet, has enabled smarter cities, more efficient energy use, and innovations in agriculture (e.g., smart irrigation) and manufacturing (e.g., Industry 4.0).

Block chain and Distributed Technologies: Block chain technology, once primarily associated with crypto currencies, is now being explored for applications in supply chains, digital currencies, healthcare, and voting systems. These innovations have the potential to improve transparency, traceability, and efficiency in a wide range of sectors.

Quantum Computing: Although still in its early stages, quantum computing promises to revolutionize fields such as cryptography, materials science, and drug discovery. It is being actively developed by countries like the US, China, and many European nations.

HEALTH AND BIOTECHNOLOGY:

Global Health Innovations: Innovations in health science and biotechnology are increasingly global in scope. The

COVID-19 pandemic highlighted the importance of international collaboration in research, vaccine development, and health responses. The rapid development of mRNA vaccines is a prime example of how global collaboration and technological advances can address urgent public health challenges.

Telemedicine and Health Tech: Advances in telemedicine, health diagnostics, and wearable health technologies are improving access to healthcare worldwide. These innovations are particularly significant in low- and middle-income countries (LMICs), where access to healthcare professionals and medical infrastructure is limited.

Personalized Medicine and Genomics: The use of genomics and personalized medicine is expanding rapidly. Advances in gene editing (such as CRISPR technology) have opened new possibilities for treating genetic disorders, while the decoding of the human genome is paving the way for personalized treatments and precision medicine globally.

SUSTAINABILITY AND CLIMATE INNOVATION:

Green Technologies and Renewable Energy: The push for sustainability is driving innovations in green technologies. Solar, wind, and hydroelectric power are being rapidly deployed worldwide, while innovations in battery storage, electric vehicles (EVs), and energy efficiency are transforming energy systems.

Climate Science and Mitigation: Global efforts to combat climate change are advancing, with increased focus on climate modelling, carbon capture, and geo engineering solutions. However, the extent to which innovation can address climate challenges is heavily dependent on political will, investment in green technologies, and international cooperation.

Circular Economy and Resource Management: Circular economy models, which prioritize recycling, reducing waste, and reusing materials, are gaining traction. This is leading to innovations in sustainable materials, waste management, and product life cycles.

CHALLENGES TO GLOBAL SCIENTIFIC ADVANCEMENT:

Innovation Gaps Between the Global North and South: While science and innovation have flourished in many parts of the world, there remains a significant gap between the Global North and South in terms of access to cutting-edge technologies, R&D infrastructure, and scientific education. This gap leads to inequities in both the benefits of scientific progress and the ability to contribute to global innovation.

Intellectual Property and Technology Transfer: The global movement of science and technology is also shaped by intellectual property (IP) laws, patents, and trade agreements. While IP protections incentivize innovation in some contexts, they can also hinder access to knowledge and technologies, especially for LMICs. The debate over global access to medicines, vaccines, and green technologies is a major point of contention.

Ethical and Regulatory Issues: As science and technology

advance rapidly, ethical considerations become more complex. Issues such as privacy concerns around AI and big data, genetic editing, surveillance technologies, and the environmental impact of certain innovations require careful regulatory frameworks that balance innovation with protection of rights and safety.

Political and Economic Instability: Geopolitical tensions and political instability in certain regions can hinder scientific progress and the movement of innovation. Countries that are in conflict or under sanctions may face challenges in participating in international collaborations or in accessing the latest technologies and research.

GLOBAL INITIATIVES AND FRAMEWORKS SUPPORTING SCIENCE AND INNOVATION:

United Nations Sustainable Development Goals (SDGs): The SDGs, adopted by all UN member states in 2015, provide a universal framework to guide global efforts in innovation and development. Science and innovation play a central role in achieving many of these goals, such as improving health (SDG 3), promoting clean energy (SDG 7), and addressing climate action (SDG 13).

International Scientific Collaborations: Institutions such as the UN Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), and the International Atomic Energy Agency (IAEA) support international scientific collaboration across various fields, from public health to nuclear energy. These bodies help to promote the exchange of knowledge, build research capacity, and set global scientific standards.

The Role of Multinational Corporations (MNCs) and Private Sector: Private companies, especially in the tech sector, are leading many global innovations. Companies like Google, Microsoft, and Tesla are at the forefront of developing AI, renewable energy technologies, and cutting-edge software tools. Governments and international organizations often collaborate with the private sector to ensure that these innovations are accessible and sustainable.

THE FUTURE OF GLOBAL SCIENCE AND INNOVATION:

Emerging Technologies: Emerging fields such as nanotechnology, biotechnology, and advanced robotics hold promise for transformative changes in medicine, manufacturing, and environmental management. However, the pace at which these technologies will be developed and deployed will depend on ongoing investments in research, infrastructure, and international cooperation.

Global Research Infrastructure: International efforts to build shared scientific infrastructure, such as particle accelerators (CERN), space exploration programs (e.g., NASA, ESA), and global research data repositories, are critical for advancing science and innovation on a global scale.

Decentralized Innovation: Increasingly, innovation is happening outside traditional hubs like Silicon Valley or Western research institutions. Countries in Asia, Latin America, and Africa are rapidly developing their own

scientific and technological expertise, driven by local challenges and opportunities. This decentralization of innovation offers exciting opportunities for more inclusive global progress.

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