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Navigating the Geopolitics of Technical Standards for India

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Executive Summary

Strategic technologies serve as a fulcrum of geopolitical and geoeconomic rivalries between technologically advanced states. This discussion document addresses the geopolitics of international standard-setting in the context of emerging technologies that require global integration. It also suggests approaches on how India should deal with these processes. The aspects covered in the document include:

1. The role of standards in the growth and governance of emerging interoperable technologies across the globe. The broad geopolitical implications of influencing the standards-setting process.
2. Approaches for setting standards around the globe. This is in the context of China's evolving role in influencing international standards in strategic technologies and its potential consequences.
3. The existing framework for setting standards in India and how the framework can be reinvented to match global standard requirements.
4. Bridging the gap between technology and foreign policy, keeping in mind the geopolitical aspects of technical standards. The approaches India can follow include:
    - The effective use of government machinery to assess and recommend technical standards.
    - Increasing India's involvement in the working of international standards organisations.
    - Using diplomatic ties for increased cooperation in the technical standards domain.

I. Introduction

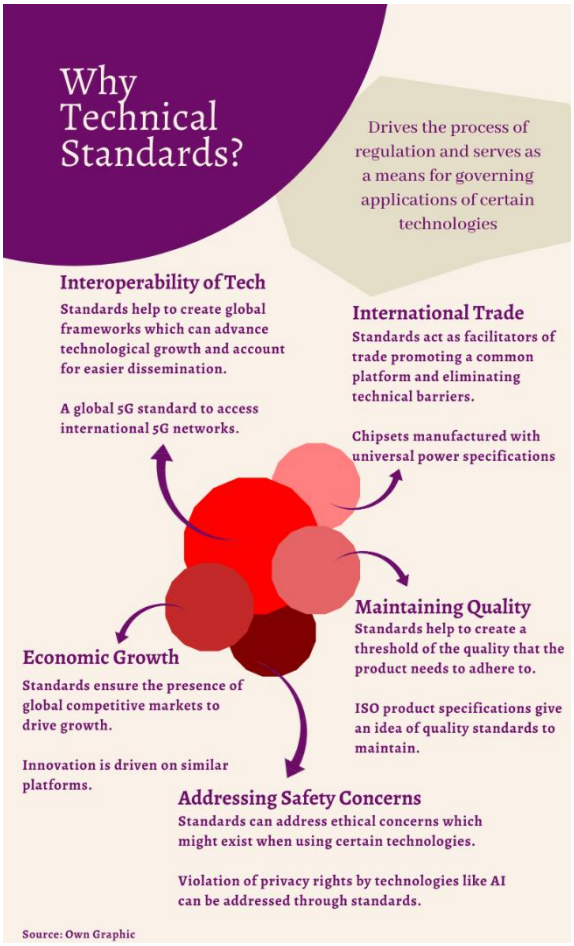
International standards in technologies are the guidelines for developing specific regulations that need to be adhered to when developing, deploying, and using technologies. These standards form the basis of a global technology governance framework that helps in the development of agreed-upon norms and procedures worldwide.

Standardisation in technology, especially strategic or critical technologies, involves regulation of the technical field. 5G and AI are strategic or critical technologies, for which attention from the highest levels of the state is required to secure national welfare against interstate competition.[1] A technical standard serves as a means of governance of a wide range of technologies and its applications. However, recent developments like states using these technical standards as potential geopolitical tools, have added a new dimension to the process of technical standard-setting.

Though 'regulation' is an overarching term used for government control, standards strike a similar chord for the private sector. Private companies (including the ones supported by states), look to create global frameworks (such as the LTE which serves as the standard for wireless broadband communication in mobile phones) for advancing breakthroughs in critical, interoperable technologies. These frameworks and standards help companies improve their market access. Standards then serve as a form of interoperability between the technological advancements made by different entities in the market.

Technical standards are not legally binding regulations by the state. They are used to facilitate international trade. These standards remain voluntary but have severe effects on trade and carry high costs for non-compliance. Hence, technology companies prefer to adhere to globally accepted standards rather than creating their own framework.

Figure 1: The Importance of Technical Standards



International standards help to reduce non-tariff trade barriers and facilitate access to new technologies. This can improve the volume of technology trade as well as promote economic and technological cooperation globally. These standards foster advancements in applications of specific technology and accelerate their reach across populations.

There is also the question of maintaining a certain level of quality in terms of meeting the basic requirements of consumers. With different companies in multiple countries engaging in developing high-end products and services, there is bound to exist a wide array of differences across the companies' products. International technology standards help create a threshold of the quality that needs to be adhered to. This can ensure a level playing field in global technological competition. Innovation in the field will see an uptick due to standards providing a clear and precise standard to preserve.

Technical standards also play a major role in ensuring workers and consumer safety. Companies must keep in mind protection the health of those manufacturing the products

and those using the products. Standards help enforce many rules and regulations in the interest of public health.

Beyond the realm of public safety, there are possibilities of emerging tech potentially infringing human rights. Applications like Artificial Intelligence (AI) and the possibility of genetically engineering humans raise ethical questions that can be answered by drafting international standards.

Some emerging technologies are proving critical for economic growth. This is where the geopolitical aspect of international standards comes into the picture. The role of standards is proving to be fundamental for both major multinational companies and states. Established standards effectively ensure the presence of competitive markets and cross-border trade. But standards can also be used as technical barriers by states hampering the exchange of technology, goods, and services around the world.[2] This has brought international standards-setting in emerging technologies come under immense political influence.[3]

There have been many calls by academics and civil society organisations for making the process of standard-setting in certain applications of technologies a foreign policy tool. An example of this is the role of Australian and European foreign ministries taking the lead on artificial intelligence standardisation.[4]

The subsequent sections of the document delve into the geopolitics behind international standards, with a special focus on standards in emerging technologies that are dependent on interoperability and integration. It analyses how the main players (EU, US, and China) follow processes to set standards nationally or regionally. A comparison between the existing framework in India and the rest of the world for setting standards is also provided. Finally, the document deliberates the foreign policy tools and frameworks available for India to influence the international standard-setting process.

II. The Geopolitics of Technical Standards

1. THE PUSH BY STATES

The development of AI or 5G requires considerable investment. Most of these are spearheaded by private companies. In some cases, these companies have enjoyed state support, with some of the funds provided by the state itself, as in the case of China and its telecom giants. Huge amounts of money would have been infused into the system. It is therefore in the interests of the state, private companies and investors to leverage the most from any innovation in the technical fields. An international technology standard helps the actors mentioned above to gain an economic and technological advantage over competitors, forcing the rest to follow a particular way of designing the technology.[5]

In recent times, there is a steady increase in government participation.[6] States are now openly advocating for certain indigenously developed standards to be adopted as the global ones. This would eventually benefit the state itself. A company headquartered in a particular state and owning a global standard in a critical technology can influence many areas of the global technology supply chain. A state's ability to obtain technological self-sufficiency in a particular domain serves as a basis for creating new international standards for global usage

The push by governments in lobbying for a suitable technical standard has effectively made international technology standards a tool of statecraft. States have used two different means to make their presence felt on the standards stage:

- Standards Developing Organisations (SDOs) -- This is the typical route used by governments to influence international standards. States have a number of individuals in leadership positions at the organisations responsible for completing the standards process. This can help in the process of lobbying for a standard that is in the interest of the state.

China has used this to its advantage with considerable influence at the 3rd Generation Partnership Project (3GPP), an international body responsible for setting the global telecommunications standards.[7] Chinese companies' representatives (Huawei, ZTE) with a high level of expertise in 5G technology, have been elected to the positions of chairman and deputy chairman at the 3GPP body. This has resulted in the establishment of global 5G standards being heavily contested between Western and Chinese companies.[8]

- Special Interest Groups (SIGs) -- This remains an unconventional approach to maintaining a presence in the international standards stage. SIGs are groups that are promoted and supported by private entities. They comprise mostly industrialists and academics who hold considerable clout in the technology area. However, their global reach might not be on the same level as that of the SDOs.

2. ECONOMIC IMPACT

The primary goal of influencing the standard-setting process in any technology is to reap economic benefits by controlling the global governance mechanism.[9] A technical standard can give a specific company and the state (if it has a role to play in the standard-setting process) intellectual property rights of the specific features or applications related to the technology. Other major technology giants would have to get licenses from whoever is setting the standard to use the technology and for any further innovation. This would make them the forerunners in the field with all competitors playing catch-up.

This can create a chain reaction in the global technology landscape. The concentration of power from setting an international standard can create a market monopoly. There is also a possibility of a bottleneck in the global supply chains for the specific technology.

The entire process of setting an international technology standard can become a quid pro quo between states, private companies, and international standards organisations in order to leverage the economic benefits.

3. IMPACT ON THE GLOBAL TECHNOLOGY ECOSYSTEM

A private entity creating a technology standard provides the specific private entity with a first-mover advantage.[10] Future advancements with the specific technology would be driven by the entity that has set standards in the field. This makes it more difficult for other companies to pursue their own research and development without first adhering to the standards set.

The pace of innovation, along with the improvement in the quality of technology, rests with the entity controlling the standards process. Technological growth in the specific sector can be subjected to getting patent approvals and licenses from the entity setting the standard. This can have major repercussions on how the technology ecosystem operates across the globe.[11]

A geopolitical contestation for standard-setting can become a barrier for potentially ground-breaking technology. This can also result in technological power blocs pursuing their own technical developments to wriggle out of the standards constraints.

III. An Ideal International Technology Standard

The primary objective of an international standard is to allow easier access and dissemination of the technology to different parts of the world. The interoperability criteria must be satisfied so as to create a common framework for governing the use of the specific technology.[12]

With increased political interference in the process of selecting a global standard, establishing an 'ideal' standard still remains a priority for any standards organisation.

An ideal standard's characteristics are varied and include,

- An International Presence - A standard must reflect global reach. While there are national and regional standards, the ones with the greatest reach usually serve as international standards.
- Bottom-Up Approach - While the policy decision-making process always has been top-down, the process of selecting a standard must be done from the ground up. Technical experts and scientists developing the technology must be given precedence over bureaucrats in the deliberation process of comparing and choosing a standard.
- Political Legitimacy - Any political interference in the standard-setting process will create ripple effects on how the technology operates globally. However, basic political legitimacy in the form of international acceptance is required for a standard to remain relevant.
- A Deliberated Process - The entire procedure of analysing, deliberating, and finally choosing a standard cannot be done overnight. It requires a long, drawn-out process to understand the pros and cons of multiple competitors. Only when such a detailed analysis is done does the credibility of the standard hold up.

- Not an Alternative to Policy -- An international technology standard plays a major role in developing a governance framework around the technology. However, this shouldn't deter a government from formulating its own policies to govern the technology. While a standard can serve as a base for the state to develop its own regulations, it shouldn't become a substitute for potential policies.

IV. The Intricate Process of Setting Standards

Technical standards may be subjected to international trade law if the standards act as trade barriers rather than facilitators. Enforcing these standards remains a challenge for all states as they continue to remain voluntary on paper. In the 3G era, though CDMA was the global technology standard, China went ahead with their own local standard for 3G which eventually did not work. But this showcases the voluntary nature of a technical standard.

Standards are deliberated and finalised in international standards organisations by a number of technical committees (TCs) and working groups (WGs). These specialised groups consist of industry experts and technocrats who make the final decision on which standard to adopt as the global one. The groups are also led by chairs and secretariats who yield immense power when the decision is finally made. Submitted standards from various companies and state-owned enterprises are compared, and the technical performance of each is assessed before the global standard is announced.[13]

There are two major global technology standards organisations currently in place:

- International Organization for Standardization (ISO) -- This is a large body composed of members from national standardisation organisations of different states. They primarily work on developing industry standards in both the technical and commercial domains.[14]

- International Electrotechnical Commission (IEC) -- As the name suggests, this body is collectively responsible for the establishment of standards related to electrical and electronic technologies. With the advancement of science and technology, IEC remains the foremost authority in finalising the standards process for any information and communication technology (ICT).

Other than the two, there exists a few private bodies such as the International Telecommunications Union (ITU) and the International Institute of Electrical and

Electronics Engineers (IEEE) which have an international presence in recommending standards to official organisations.

Apart from multiple international bodies, there are many national and regional standardisation bodies dealing with technical standards. Europe has its own standards body for telecommunications, the European Telecommunications Standards Institute (ETSI). The United States has its own organisation called the National Institute of Standards and Technology (NIST) which is responsible for maintaining competitiveness in the technology industry. These bodies primarily look at how an established regional standard can be adopted as the global technical standard.

However, standards submitted to international organisations for consideration are chosen through different processes in each region. The European Union (EU) and the United States (US), which had a monopoly over the technical standardisation processes until recently, adopted a different method when selecting a regional standard compared to China. India, too, has its own framework when setting standards. Understanding each of these mechanisms helps policymakers choose the appropriate path India can take when proposing its own standard at an international organisation.

1. THE EUROPEAN APPROACH

The European Union has a unique method of setting technical standards which involves both the private sector and the governments. It can be called a public-private partnership (PPP), which is mostly driven by the private industries along with a robust regulatory framework to govern the usage of these technologies.[15]

The process follows a certain hierarchy. Precedence is always given to the standard at the continental level than one at a state level. If a national-level standard contradicts that of a European-level standard, then the former is deemed invalid.

Technical standards are completely developed by private bodies specially licensed by the EU. These private standardisation bodies are solely responsible for creating standards that conform to existing regulations issued by the European Commission. In the continent, the license is granted to only one private body in a particular country and a specific sector to develop these technical standards.

However, private entities are not solely responsible for the creation of technical standards. Regulations formulated by the member states of the European Union depend on the standard created by the licensed body. Technical standards generally follow the regulations of individual member states and the regulation of each state references the standard as the regionally accepted one. The European Commission can also direct these private bodies to issue licenses when required.

This kind of partnership between the state and private standardisation bodies ensures a certain degree of autonomy in creating technical standards without political interference. It also ensures that the standard created is within the regulatory framework which is put in place by the governments.

Europe's two main standardisation bodies, CEN and CENELEC, have a close relationship with the international bodies, ISO and IEC. A number of European regional standards have been adopted as global standards by international bodies. This has ensured Europe's standard strength and its place in developing a global regulatory framework for any emerging technology.

2. THE UNITED STATES APPROACH

Unlike Europe, the United States' approach to setting standards is completely driven by the private sector and is subject to market forces. In the US, the government has given authority to a large number of standards organisations and industry associations in each sector of the economy to issue their own technical standards. Most of these organisations are private. The American National Standards Institute (ANSI), which is the United States' official representative to international standards bodies, does not have any authority over national standards organisations. This has led to a rise in competition among these standards organisations to come up with their own standards to pitch at the international level.[16]

The hierarchy of the European Union does not exist in the United States. There is no single national standard supported by the federal government and no single national organisation with superiority over the others.

In the US, the concept of technical standards is perceived as more of a private self-regulating affair than a state function. Hence, the process of setting technical standards

in the US is majorly driven by the private domain. The state and its official standards institutions still hold considerable clout in finalising national level standards. The selection of the competing standards also rests on the forces of the market rather than an official national standard organisation taking a decision.

3. THE CHINA APPROACH

Processes followed in China when setting standards completely deviates from that of the US and Europe. The technical standardisation process in China is dominated and controlled by the state.

At the outset, standardisation looks like a collaborative effort between the state and the private industry. But a closer look shows that the party-state is involved in every step of the decision-making process and the final decision rests with the state. This state-centric approach followed by China also makes a distinction between mandatory and voluntary standards. However, all the voluntary standards are also treated by the industry as compulsory with almost all firms complying with the standards.

There are mainly two types of standards used in China. Classification is based on the authority responsible for setting the standard and the extent to which market forces play a role in finalising standards.[17] The two main categories include:

1. **State Tier Standards -** These are the technical standards under the control of the state. The government has the authority to set, change and remove standards as they please without consultation of the private sector. Based on the authority setting the standard, this is further divided into three types:

    - National Standards - Nationwide standards which address the most important and fundamental issues concerning the state such as healthcare and security. This is developed by the Standards Authority of China (SAC).

    - Sector Standards - Technical standards issued to govern specific sectors of the industry. Telecommunications, semiconductors, and other emerging technologies have their own standards. The authority responsible for these standards are the respective national ministries of the country.

- Local Standards - Provincial level standards that remain in effect only for a certain geographical area within the country. This kind of standard ensures economic protectionism for the region. The local or provincial governments are responsible for setting these standards.

2. **Market Tier Standards** - These technical standards have been developed with the help of private industries in the country. They can be subject to market forces and can be changed depending on the feedback which the industry provides to the state. Based on the governance framework, this is further divided into two types:

   - Association Standards - Typically shaped by the Chinese industry with the support of the government. But a freehand given to the industries to develop their own standards has resulted in a multitude of standards being announced. This has ruffled feathers in the government who feel that multiple standard associations make it harder to prioritise which technical standards to push for at the national and international level.[18]

   - Enterprise Standards - These are nothing but the product specifications of a particular company and do not have much strategic impact. However, this is also used as an instrument of oversight by the state as companies are encouraged and sometimes compelled to register their standards with the state authorities.[19]

Despite the many types of standards that China uses, the new Standardisation Law in 2018 categorically states that only the national standards developed by the SAC remain mandatory and other types of standards continue to remain voluntary for the industries operating in the country.

While industry participation in the standard-setting process has increased over the years in China, the state and the party continue to dominate all major commercial sectors.[20] The process continues to be heavily influenced by the state authorities although the idea behind standards facilitating interoperability is secondary to compliance with the state's industrial policy goals.[21]

However, the decisions made, with the state's influence, are finally deliberated and announced by the private industry due to the lack of technical knowledge within the bureaucracy.

4. INDIA's EXISTING FRAMEWORK

The government in India has established the Bureau of Indian Standards (BIS), as the official national standards body. However, the BIS focuses on standards to be adopted for certain products which are developed by the industry. There is no official organisation to provide inputs on how to regulate the use of specific technologies.

The Indian Standards Act 2016, replacing the old 1986 law, came into effect in 2017. This allows the government to notify products for which compliance to specific standards are mandatory. Technical regulations can be issued by various ministries within the government in the form of "Quality Control Orders".[22]

India's framework to standard-setting remains nascent and there is a need to improve the process in order to wield influence in international standards organisations.

Technical standards in India have mostly been adopted from global standards, especially with emerging technologies. In recent years, regional and national technical standards have been pushed forward to integrate certain sectors across the country. The Telecommunications Standards Development Society of India (TSDSI) last year approved India's homegrown 5G standard, named 5Gi, which was developed by scientists from the Indian Institutes of Technology. 5Gi further went on to get approval from the International Telecommunications Union (ITU), a specialised UN body responsible for the effective use of communication technologies. 5Gi is India's first foray into developing technical standards in emerging technologies. Despite the drawbacks of 5Gi, it serves as a small step towards improving the technical standardisation process. This will help India eventually navigate the geopolitics of international technical standards.

5. WHAT APPROACH SHOULD INDIA CONSIDER?

India, until the 1991 economic reforms, suffered under excess regulation by the state. This crippled many sectors of the economy. China's state-controlled approach to standard-setting would set India on the path back into the 'License Raj' era. Excessive state

interference might also hamper the growth of the fledgling and growing private sector in India while the private sector in China has already firmly established its importance on the global stage. This would also mean that technical standards will serve as a compliance issue rather than as a tool for technological innovation.

The United States has a robust mechanism in place for setting technical standards due to its private sector-led approach. With licenses provided to multiple associations and bodies to formulate their own standards, the US approach might not work for India's economic society that still has some technical sectors like nuclear technology and avionics influenced by the government-backed public sector undertakings (PSUs). This approach may adversely impact the standard-setting process as the government-backed entities will get precedence in developing national standards thereby eliminating any competition in the field. Unlike the US, the private sector in India, barring a few technology domains, has few local companies which have the capital to invest in cutting-edge research and development. Without innovation in the field, setting technical standards seems way out of reach for any developing economy.

The European approach of a 'PPP' model to integrate both state regulation and private sector freedom in setting technical standards seems the perfect way for India to get accustomed to the space. India's political structure allows the Union government to work with private companies in driving the process of setting standards for certain technologies of strategic importance. This would mean that a considerable amount of funding could be state-driven and the private sector can focus on innovation to create a local, homegrown technical standard. The fear of excessive interference by the bureaucracy in regulating the usage of certain technologies can also be reduced from the participation of private companies.

India, as a major stakeholder in the global technology ecosystem, must ensure collaboration between the state and the private sector in promoting and influencing global technical standards. The state can support and finance the domestic private sector for developing critical technologies which might gain strategic importance in the near future. Multilateral forums which India is already a part of, such as the Quad, have already set up a working group on critical and emerging technologies. This can help the state identify which technologies to focus its efforts on. Identification of potential private sector players who show considerable growth in developing these technologies should be a primary responsibility of the state. Incubating these companies through services like

providing technology training and giving capital expenditure support can help the state in the future. Taiwan and TSMC, China and Huawei, South Korea and Samsung, etc. can serve as models for India's foray into achieving technological self-sufficiency.

V. India's Role in the International Technical Standards Ecosystem

1. THE GUIDING PRINCIPLES

India's involvement in creating international technical standards must be guided by these principles:

- Scientific progress and technological innovation must be the driving force for setting technical standards. With greater innovation, India's domestic private sector companies can compete for setting global standards in certain areas of technology which would in turn foster progress in the field.
- Focus on technology interoperability and integration with the global technology ecosystem. The emphasis of India's involvement in standard-setting must be given to certain strategic technologies that need interoperability to facilitate growth and development of the domestic sector as well as increase geopolitical influence.
- Balancing the economic and national interests of certain technologies. India must focus on the areas which would provide a good economic return and protect the nation's strategic interests at the same time.
- Platform for effective policymaking and regulation. Technical standards developed by India in specific technologies should serve as a base for local policymakers to formulate certain policies to regulate and improve the growth of these sectors in the country.

2. POTENTIAL APPROACHES TO NAVIGATE THE DOMAIN

A bridge between technology and foreign policy by the state must be created to complement each other in the current political climate. There have been calls by academics and experts, from both the EU and Australia, for their respective foreign ministries to play an active role in AI standardisation process.[23] This, coupled with the

private industries and their ever-increasing role in swaying the government's key decisions, makes it imperative for states to include international standards as part of their foreign policy agenda.[24]

A number of technically adept countries like India and Israel, have a major presence in the global technology markets but remain minor players in international standard organisations. They have little or no influence in the decision-making process of global technical standard-setting. Their focus must be on developing emerging technologies along with rapid innovations to remain competitive and relevant enough to influence the standards process. India relies on international companies to invest and set up R&D facilities in the country. This must be addressed. Institutional support along with capital investment can help accelerate technological innovation in the private sector. This can provide leverage at international standard organisations due to the advanced technology likely becoming the global standard. This also provides an opportunity for both the private sector in the technology domain and the state to find common ground in working towards developing the required heft in international standards developing bodies.

A technology policy perspective must be developed by foreign policy experts when dealing with decisions by international standards bodies. There are several ways to bridge the gap between technical experts' opinions and policy formulators' visions in the country, especially with respect to international technical standards.

Utilising the State Machinery

The creation of a working group within the government on technology standardisation can help streamline the process of the state getting involved in the standard-setting process. This can be an intra or inter-agency group which would be responsible for the assessment of different standards across technology domains such as AI, Blockchain, 5G, etc. The group can comprise a mix of industry experts in the respective technical fields and bureaucrats who have considerable expertise in dealing with international technological forums and the intricacies of emerging technologies. The group can then recommend to the government which standards seem suitable to adopt.

National level committees can be formed to oversee the working of both Standard Developing Organisations (SDOs) and Special Interest Groups (SIGs). These committees can be given the responsibility of being India's official standard body at international organisations along the lines of the United States' ANSI. This gives the

state an insight into how the state can maintain its presence in the international standards domain. The committees might be used to regulate and improve the functioning of national standards organisations. This can in turn help in strengthening the government's case at the international level.

Increased Involvement in the Standards Organisations Sphere

Effective utilisation of the country's public sector can help increase India's influence in the standard-setting organisations. There are many public sector entities in India that still have considerable clout in the policy decisions of the government. Representatives from the public sector, who are technically adept, can form technical committees and be sent as the country's official representatives to international standards organisations. Respected experts from these public sector companies can be made use of to voice the state's concerns and opinions when it might be forced to adopt a particular standard. In case of the absence of a major public sector entity in a particular field, the state must turn to non-state actors.

Representation from the private sector, academics, and civil society organisations must be encouraged. These non-state actors have an important role in determining technical international standards. Technocrats and highly knowledgeable personalities in the field are those who have credibility in international circles and can influence the standards process. Standards organisations need advocates from outside the government or the public sector who can put forth their opinions about how particular standards might fare in the country, if it is feasible for both the specific technology sector and the state to adhere to the standard which might be set as the global one.

Diplomatic Overtures

Increased international collaboration in terms of standardisation activities provides a platform for the creation of technical standards alliances. Along the same lines of technology transfers between countries, joint standards can be formed and adapted to suit the needs of the entire region. Cooperation between intergovernmental agencies, especially in the technology sector, between like-minded countries can help developing countries to have a say in the standards-setting process. The monopoly of the West in these processes has been challenged by China's technological growth in the 21st century. But other technically adept countries can make their voices heard through standards partnerships.

VI. Conclusion

India, despite being one of the biggest contributors to the global technology ecosystem,[25] is a novice player when it comes to wielding influence in technology standards. However, recently the ITU approved a homegrown Indian 5G standard called the 5Gi, which was developed in the hope of bridging the urban-rural technology divide. Technological innovation is growing but has a long way to go before locally developed technology can compete on the global standards stage. Technological innovation is required to complement our own regional standard in which India still lags behind. There is a need for the government to take cognisance of the importance of technology standards but also develop a realistic view on how India should play a role in the standard-setting process.

There exists a void between the state and the private sector in the technology domain which must be addressed. The government must recognise the role of emerging technologies and their influence in the future.

The decline of the dominance of Europe and the United States in the standards domain offers an opportunity for India to play a bigger role in finalising and setting technology standards. However, there is also a need for the country to increase its technical capabilities and work towards strengthening the technology sector. Once the domestic technology sector, supported by the state, can gain some heft on the international stage, India can play an active role in advocating for a standard that helps boost its domestic economic growth and project geopolitical influence.

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