# Role of the Indian Supreme Court in Shaping Technology Development

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# Role of the Indian Supreme Court in Shaping Technology Development

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# *Role of the Indian Supreme Court in Shaping Technology Development*

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*Public interest litigation questioning risk regulation of emerging technologies has been a mechanism through which the Supreme Court has become increasingly involved in the national narrative on technology, development, risk and the role of the state. Such litigations include biotechnology and nuclear technology which have also been identified as important ingredients of the national development agenda. This is similar to other developing countries where identification of emerging technologies that help the economy leapfrog, have become part of the development agenda. Understandably the focus of the state is on development rather than on risk regulation. This has attracted considerable criticism from civil society groups and legal challenges to the regulatory framework. The Supreme Court despite its stated lack of competence to understand and address technological issues and its innate restraint to comment on what it deems to be policy matters, has been forced to address issues of risk regulation and in the process play a critical role in constituting the technology and shaping the imagination of that technology within the national narrative. The aim of this article is to examine and evaluate the role of the Supreme Court in this context through an analysis of two case studies of nuclear technology and biotechnology.*

## Introduction

India has, since independence, embraced a technological vision that was closely aligned to the economic development of the state. Secured long-term public investment in technology has been a critical feature of the five-year planning model that was adopted by Nehru and which continues to be the primary means of allocation and distribution of public finance.[1] This technological vision has been supported in two ways; first, this has led to the horizontal adoption of specific technological solutions to combat social problems like water scarcity, agricultural productivity, urban waste management, etc. Second, the state has promoted targeted

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investment in emerging technology areas that it considers to be critical in allowing the economy to leapfrog (Ramani et al., 2011). The Department of Atomic Energy (DAE) that was set up soon after independence in 1953 is a good example of the targeted public investment in nuclear technology which held the promise of cheap electricity amongst other uses.

This national narrative has had enormous impact on the role of the state in negotiating and addressing uncertainties over health and environmental risks that may emanate from some technologies such as nuclear technology, biotechnology and nanotechnology. Thus the role of the state in the Indian context is seen as conflicting to say the least (Chowdhury, 2013). Given that it is heavily involved in the promotion and development of certain technologies, its role in being a neutral arbiter in addressing issues of risk regulation, is seen to be in conflict with the latter. Although both these functions of the state are separated between different departments and ministries: thus for instance it is the Ministry of Environment and Forests (MOEF), through the Genetically Engineered Advisory Committee (GEAC), that acts as the regulator, whereas the Department of Biotechnology (DBT) is tasked with the promotion and development of biotechnology. Institutionally this conflict is reflected in the newly drafted Biotechnology Regulatory Authority of India Bill 2013, which is being piloted by the DBT whereas the regulatory expertise in terms of health and environmental risks are located within the MOEF and the Ministry of Health and Family Welfare (MOHFW). The DBT has tried to justify its role on the basis of domain expertise even through regulatory expertise in terms of managing health and environmental risks clearly lie outside its domain.

The Supreme Court, as an actor, has in many ways reflected the national narrative—when it has chosen to repose its faith on technological solutions to social problems. Thus for instance the Supreme Court has, in an order dated in 2009 in the case K. Balakrishnan and Ors. vs Union of India, ordered the setting up of a technological mission which would find solutions to water scarcity nationwide on a 'war footing' (MoST, 2010). On the other hand, conflicts over the regulatory role of the state and the adequacy of the regulatory framework to address risks from technologies have also involved the Supreme Court as a forum through public interest litigation. In fact the rich environmental jurisprudence (and despite its lack of significant impact on the ground, Cullet, 2011; Rajamani, 2007) developed by the Supreme Court, and that hinges on the fundamental right to life has in effect, forced the hand of the Supreme Court to admit and consider public interest litigations that focus on this conflicting role of the state—that of a developer as well as a regulator of risks emanating from such technologies.

The Supreme Court is therefore an important actor in constructing and shaping public policy narratives on technological development and regulation in India. And given that in India, it is the state which drives investment in technological development, this role assumes immense significance. Science policy and the Science and Technology Studies (STS) research in India has concentrated primarily on the changing nature of innovation (Alam and Langrish, 1984; Chaudhuri, 1986; Desai, 1980; Marin and Sasidharan, 2010), internationalisation of

R&D (Aggarwal, 2000; Asakawa and Som, 2008; Krishna et al., 2012), technology forecasting (Chowdhury and Sahu, 1992; Haley and Haley, 2012) and the role of scientists and the effect of science on specific target groups like women, etc. (Gupta et al., 2005; Khandka et al., 2012). Indian social scientists have only marginally looked at law as an important arena in which technology development trajectories are shaped and negotiated (Jasanoff, 1999; Krishna, 2001a; Torri, 2011). The law has only been seen through a limited lens of having a downstream role in providing regulatory tools for implementing social choices that are made within domains of governance that lie outside its influence and impact (Dutta and Narayanan, 2011). The primary objective of this paper is to challenge this presumption within contemporary STS in India, through a case study of the role of Supreme Court in technological development and regulation in India and thereby underline the role of law in constituting technologies (Faulkner, 2009).

The article has been divided into five sections. The first two sections provide an overview of the national narrative that has shaped the Indian state's active involvement in technological development through public investment driven by departmental bureaucrats. The third section concentrates on framing the role of the Supreme Court through a series of judgments in which it has, despite its oft reiterated lack of competence in technological matters, deliberated on technological solutions, technological development and addressed risk regulation issues with reference to specific technologies. The fourth section provides a detailed analysis of two judgments—Aruna Rodrigues & Ors. vs Union Of India & Ors. and G. Sundarrajan vs Union of India & Ors—that focus on regulation of GMOs and nuclear technology respectively and which reveal important aspects of the Supreme Court's thinking on the legitimacy of the national narrative on technology development as a critical input in economic development, role of the state, role of civil society within the decision making, etc. The fifth section, which is the concluding part, provides some preliminary comments on the influence of the court's thinking in shaping the development trajectory of specific technologies in India.

## National Narrative on Technology Development

The first step in defining a state role in technology development was in the context of the Second World War, through the establishment of the Board of Scientific and Industrial Research in 1940. This was quickly followed by the Council of Scientific and Industrial Research (CSIR), which was formed in 1942 (Krishna, 1995). The research program on Indian oil seeds focused on the use of vegetable oils in the manufacture of lubricants—this highlights the initial impetus—import substitution through the use of indigenous materials and substances—that drove national science programs (Ganguly, 2013; Richardson, 2002).The private sector was considered not developed enough to be burdened with the task of national development. Instrumentation and manpower training was pursued by setting up a chain of national laboratories under the operational supervision of the CSIR.[2]

The National Physical Laboratory, New Delhi and National Chemical Laboratory, Poona focused on residual issues under the first three five-year plans. Given the strategic connotations, the Indian Atomic Energy Commission was first set in August 1948, followed by the establishment of the DAE in 1954.

To a large extent this political drive towards technological development was a function of the friendship between Jawaharlal Nehru (the first Prime Minister of India) and eminent scientists ([Sharma, 2013], specifically P. C. Mahalonobis, Homi J. Bhabha and Shanti Swarup Bhatnagar). The establishment of the National Planning Committee by the Indian National Congress in 1938 was the first step towards initiating a conversation between scientists and politicians like Nehru in developing a national developmental plan that hinged on targeted public investments in technology (Anderson, 2010). Mahalonobis had established the Indian Statistical Institute in Calcutta in 1932 and was invited by Nehru to oversee the Planning Commission. The Board of Scientific and Industrial Research was the predecessor to the CSIR and was headed by Shanti Swarup Bhatnagar who leveraged his close links with industrial houses like the Tata's to develop a chain of national laboratories in key areas of industrial research. Beginning with the establishment of the Atomic Energy Committee under the CSIR umbrella in 1945, it was ultimately hived off into a separate Department of Atomic Energy in 1954 under the purview of Bhabha. All these three scientists were also institutional builders and it is to their credit that the institutions that they had envisaged and built have continued to flourish till today (Krishna, 2001b).

It was the third five year plan which was the first document that specifically spoke of the increasing gap between the developed world and the developing countries and, most significantly, identified science and technological development as an important area through which this gap could be bridged.

> Since the Second World War, the pace of scientific and technological research in more advanced countries has greatly increased. In the economy of these countries, scientific research has an important and honoured place and receives every encouragement. As the field of enquiry and investigation widens, larger funds are invested, there is intense search for scientific talent, the number and quality of research workers improves, the pace of research is accelerated, and results are achieved with greater speed. One of the results of this activity in the more advanced countries, however, has been that the gap between the advanced and less advanced countries tends to become ever larger. The task before India is to cover this distance by putting in the utmost effort in the development of scientific and technological research, and in the application of science in the furtherance of her development programmes. (Planning Commission, 1960)

Public research investment was steadily increased over the consecutive five year plans and unsurprisingly one witnessed a quantum leap in science and technology investments from ₹330 million during the second plan (1956–61) to ₹3375 million

during the sixth plan period (1980–85). This was a jump of nearly 1000 per cent. The science and technology development plans were developed in consultation with groups of industries—chemicals, electronics, drugs and pharmaceuticals; along with the 'user government departments'. The aim was to identify science and technological inputs across all departments and activity spheres—and ultimately develop a 'scientific temperament' in the country (Chamarik and Goonatilake, 1994).

With the beginning of the 1970s, the Department of Science and Technology (DST) was established as the nodal agency for the coordination of scientific research programs. In 1981, the Department of Ocean Development was formed. In 1986, the Department of Biotechnology was established. Currently there are six such departments that are functioning under the Central government.[3] The 80s also mark a clear shift in science policy underlined by the need for 'perspective planning'. Thus the Technology Policy Statement of 1983, identified food, health, housing, energy and industry as priority areas for technology development. Interestingly it also laid emphasis on the need to ensure ecological balance in terms of considering the long-term effect of many technologies in the environment. This emphasis seems to have disappeared from subsequent science policy statements.

The sixth five year plan document illustrated the shift towards prioritising development of specific technologies:

> In order to utilise our existing manpower resources and strengthen the infrastructure of our institutions, so as to leapfrog into advanced areas of science and technology, it will be necessary to concentrate on well selected areas of science and technology and provide the requisite amount of resources so that major breaks through may be achieved in the selected thrust areas; these must be chosen such that even limited resources can make an impact. The identification of these thrust areas and assignment of appropriate priorities is a continuous process involving interaction amongst different groups of scientists and technologists from educational and research institutions as well as from the industry. (Planning Commission, 1980)

These included biotechnology, information and communication technology (ICT), space technology, materials technology and oceanography. Just as the earlier plans were marked by horizontality, the later plans put more focus on specific strategic areas. Public research investment has in fact constituted 75–80 per cent of the total R&D expenditure in India (Deloitte, 2011). This is especially stark compared to the private sector funding 58 per cent in China, 65 per cent in the USA and approximately 75 per cent in Korea and Japan (Greuber, 2009).

The role played by the state in science and technology development has only deepened and expanded in post independent India. Has such a forceful role impacted the regulatory capabilities and functions of the state? I look at the atomic or nuclear sector and the biotechnology sector, to answer this question. Institutionally these two sectors are alike. Both are governed by dedicated government departments

set up specifically to develop and promote the technology. Also both these two technologies are of strategic importance (economic and energy security) and therefore occupy high national development priority. Both are alike also in terms of the several health and environmental risks that characterise them. What has been the institutional response of the state to this challenge?

The DAE was established in 1954 as a separate department of the Government of India under the leadership of Homi J. Bhabha and under the direct charge of the Prime Minister of India. The DAE has operational control over five research centres, three industrial organisations, five public sector undertakings and three service organisations. Its major achievement has been the development of an indigenous nuclear power reactor and associated fuel cycle technologies through the three-stage nuclear power program. This was a specific achievement because it was done in the context of international isolation and technology denial regime following the first nuclear test in Pokhran in May 1974 (and which lasted till 2008). There are currently twenty nuclear reactors in operation in India with a total capacity of 4780 MW in six sites (DAE, 2012). According to the Atomic Energy Act 1962, foreign equity investment in nuclear power projects are not permitted. Thus foreign collaboration has been through the debt route for accessing foreign funding (for example, the Kudankulam project was set of through Russian state credit). Currently India has signed fuel supply agreements with the Russian Federation, Kazakhstan and France.

The Atomic Energy Regulatory Board (AERB) was constituted in November 1983, to undertake the regulatory and safety functions provided for under the Atomic Energy Act, 1962 and also under the Environment Protection Act, 1986. What explains the two-decade delay in formally establishing a dedicated safety body? Although there have been the several safety review committees established for specific atomic power stations—it was international events like the Three Mile Island nuclear accident in March1979 that led to a rethink and ultimately in the setting up of a body to look at all nuclear installations including public sector undertakings. The AERB functions through a number of committees—the two most important being the Safety Review Committee for Operating Plants (SARCOP) and Safety Review Committee for Applications of Radiation (SARCAR). It is not a statutory body with a separate legal basis. It functions under the overall supervision of the DAE. It draws its personnel from DAE units, other governmental organisations, academic institutions and research institutions. AERB has considerably expanded the scope of its regulatory activities.[4]

In terms of technical expertise the AERB is very strongly placed as a regulatory body—but it does not have an independent mandate—its pronouncements are in the nature of advisories and recommendations and therefore not legally mandatory. The Comptroller and Auditor General (CAG) had also undertaken a performance audit of the AERB and had criticised certain aspects of the functioning of the AERB—specifically with reference to its lack of independence, absence of a comprehensive radiation 'safety policy' and being unable to monitor the proliferation of unregistered private X-ray facilities.

The CAG in its performance audit report quite clearly stated the following:

> AERB was constituted in 1983 under Section 27 of the Atomic Energy Act, 1962, which allows the Central Government to delegate any power conferred or any duty imposed on it by this Act to any officer or authority subordinate to the Central or State government. Section 27 of the Act currently does not provide for constitution of any authority or Board and merely provides for delegation of powers to a subordinate authority. Therefore the legal status of the AERB can be seen to be more of a subordinate authority with powers delegated to it by the Central Government than of a statutory body with independent powers. AERB has thus not been created by any specific legislation. (CAG, 2012).

An insufficient degree of administrative distance between its parent ministry—the DAE and the AERB—means that it fails to satisfactorily address the challenge of conflict of interest. This is also in contrast to international practice. For instance in the USA, a Nuclear Regulatory Commission was established by the Energy Reorganization Act of 1974, similarly in France such functions are overseen by the Nuclear Safety Authority that was established by a separate Act in June 2006.

Thus the CAG noted that the AERB's independence is circumscribed by the following aspects:

1. Lack of institutional separation of regulatory and non-regulatory functions.
2. The tenure of the AERB chairman is not fixed.
3. No separate budgetary authority.
4. AERB reports to the AEC whose activities it is supposed to regulate.

In response to these criticisms, the government has sought to underline the Nuclear Safety Regulatory Authority Bill that was introduced in the Lok Sabha on 7 September 2011 with a 'view to converting functional independence of the AERB to *de jure* independence'.[5] This bill has been reviewed by the Standing Committee and is expected to come up for discussion in the winter session (2013) of the Parliament.

In the case of biotechnology, activities and processes involving genetically engineered organisms are broadly regulated under the Rules for Manufacture, Use/Import/Export and Storage of hazardous Microorganisms/Genetically Engineered Organisms of Cells, 1989, a notification issued under the Environment (Protection) Act, 1986. It was therefore the Ministry of Environment and Forests (MOEF) that had constituted the Genetic Engineering Appraisal Committee (GEAC) to oversee all approvals of GMO related activities via this notification in 1989. The GEAC has approved experimental field trials for the purpose of generating bio-safety data with respect to GM crops such as cotton, rice, castor, wheat, maize, tomato, groundnut, potato, sorghum, okra, brinjal, mustard, watermelon, papaya, sugarcane, rubber, banana, pigeon pea and chickpea. Currently seventy-nine applications with respect to eleven crops are pending with the GEAC. Due to the objections

raised by certain state governments to the field trials of GM crops, the GEAC has decided that in the first instance it would obtain No Objection Certificates (NOCs) from state governments before issuing a letter of approval. Significantly numerous GEAC decisions have been repeatedly challenged in the Court on grounds of non-application of administrative principles, lack of transparency and lack of scientific capacity to undertake regulatory functions.[6]

The Bt-Brinjal case however is the most famous instance of executive action taken by the Ministry of Environment and Forests on this issue. It is important to underline that the GEAC is the final authority to give approvals for field trials of GM crops as well as final approval of market release. The 1989 Rules do not provide for any scope of review of the approvals granted by the GEAC other than via individual judicial appeals. However this is what exactly happened in the commercialisation of the Bt-Brinjal case. The GEAC perhaps mindful of the impact of its decision—requested that its approval for environmental release may be referred to the government for a final decision. The government went ahead with a number of public consultations with civil society organisations, public scientists (for instance Dr M. Vijayan, President of the Indian National Science Academy suggested a limited release) including with the state governments and ultimately came to the conclusion that there was a need to 'adopt a precautionary principle based approach and impose moratorium on the release of Bt-brinjal till such time independent scientific studies establish…the safety of the product from the point of view of its long term impact on human health and environment'.[7]

The moratorium actually overruled the decision of the GEAC to grant conditional approval to the release of Bt-Brinjal. This highlights the lack of independence of the GEAC and the need for an independent and robust regulatory mechanism as is functioning in the European Union, Canada and the USA (Lofsted and Vogel, 2001).

Currently there is a bill that proposes the establishment of a statutory independent regulator—Biotechnology Regulatory Authority of India (BRAI) which would perform the safety assessment and oversee product approvals. The bill was developed by the Department of Biotechnology. It was claimed that they have the scientific expertise to do so. However others have also argued that the health and environmental safety risks and safety issues can only be dealt by ministries/government department that has the mandate to do it—namely, Ministry of Health and Family Welfare (MOHFW) and the Ministry of Environment and Forests (MOEF)—and not by the Department of Biotechnology, which has been constituted to develop and promote the technology. The BRAI represents a compromise. Although the DBT, under the Ministry of Science and Technology that is shepherding the bill, the substantive provisions of the bill provides for collaborative arrangements and sharing of regulatory functions with two other agencies—the Food Safety and Standards Authority and the Drug Regulatory Authority (yet to be established).

Another criticism that has been levelled against the proposed bill is that it negates and substantially limits the right of the state government to take a contrary view to that of the BRAI. Strictly from a legal point of view, the provision of appellate

body within the BRAI allows a state government to challenge any decision of the BRAI. Further, institutionally the State Biotechnology Regulatory Advisory Committee could also provide some leverage to state governments in influencing decision-making within the BRAI. Indeed the federal question is critical in addressing issues of subsidiarity in questions of environmental and health risk regulation. If the BRAI would also more explicitly include socio-economic issues in its product approval decisions, then perhaps this could be a factor that could be the basis for state determination. Overall, the BRAI is a significant improvement from the current regulatory structure and if implemented successfully should be able to secure a sufficient administrative distance from its parent ministry (Huising and Silbey, 2011)—the DBT—to allow for independent and effective regulatory functioning.

The discussion in the previous paragraphs are evidence of the deep embedding of the national narrative of science and technology within state craft and its influence in shaping the state's response in developing risk regulation discourses vis-à-vis specific technologies that it has actively sought to develop and promote in the 'national interest.' This is in contrast to institutional settings that function in other jurisdictions. Thus for instance in the context of the European Union, there is a clear legal and operational separation between institutions (European Commission) pursuing economic development in different arenas—like the Director General of Trade, the Director General of Internal Market and Services—from that of sectoral regulators that are legally independent from policymaking institutions and operate under European public law, for example, the European Environment Agency (EEA), the European Food Safety Authority (EFSA), the European Medicines Agency (EMA), the European Chemicals Agency (ECA), etc. The purpose of legal separation and constitution is to ensure independence of operation and action that is critical in ensuring regulatory autonomy in decision-making without fear or favour. The next section discusses some seminal cases through which the role of the Supreme Court is traced vis-à-vis technology development and regulation in India.

## Supreme Court and Technology Development

The approach of the judiciary in using or regulating technology has been relatively different from that of the executive. As against the focus of a technocratic executive, which has often been on the promotion of a technology as an end, the judiciary has relied on technology as a means to achieve an end in the larger public interest. It is interesting to note that during the early days of post-independent India, the Courts followed a relatively conservative approach in limiting themselves strictly to legal adjudication. It was only during the post-Bhopal phase (post-1984 after the Bhopal Gas Disaster which is the biggest industrial accident in India) that the Courts took an active interest in developing environmental jurisprudence based on expanding the fundamental right to life as specified under Article 21 of the Constitution.

Thus judicial activism really came into own with the Supreme Court spearheading active involvement in policymaking on a diverse range of issues (Chowdhury, 2013).

The Supreme Court has often resorted to technology for addressing developmental challenges, especially the ones that relate to human access to basic amenities and a cleaner environment. Rooted in judicial activism of the 1980s, the Court has often taken cognisance, either *suo moto* or in response to a public interest litigation, of the failure or laxity of the executive in performing its functions and furthering its mandate in the interest of the public. In doing so, the Court has often taken recourse to technology as a means to provide options or solutions for the problem at hand. Here, I examine two such cases where technology has been seen as something with a potential to ameliorate the concerns of millions. One is the much-talked about vehicular pollution case leading to the conversion of public transport fleet to compressed natural gas; another is a relatively lesser known case on water leading to formation of a scientific committee to find solutions to the problem of water shortage.

In 2001, a writ petition was filed by the M.K. Balakrishnan seeking protection of wetlands. This petition was filed with the aim of bringing the national laws into conformity with a Calcutta High Court judgement in the case People United for Better Living in Calcutta vs the State of West Bengal and Others.[8] The High Court recognised the wetlands in the eastern fringes of the city as a Ramsar site and upheld the demands of the petitioners to stay all developmental activities in the sites. The case was also noteworthy because paddy fields were declared as productive wetlands.

The Supreme Court admitting this petition ruled that

> Although, the writ petition as framed related to protection of wetlands in the country for preservation of the environment and maintaining the ecology, we have suo moto expanded its scope as mentioned below.
>
> There is acute shortage of water in our country and one of the main reasons for that is that most of the water conservation bodies in our country such as ponds, tanks, small lakes etc. have been filled up in recent times by some greedy persons and such persons have constructed buildings, shops etc. on the same. (Paragraph 2 of the judgement)[9]

The Court therefore widened the ambit of the case to address the issue of water scarcity in general. It held that water is intrinsic to enjoyment of the right to life under Article 21 of the Constitution of India. Besides bringing water under the right to life, this case delved into the role of technology in addressing water-related challenges for the country. The Court issued a notice to the Ministry of Science and Technology to report on the measures taken by it to solve the issue of water shortage in the country. In an earlier ruling, the Supreme Court had recommended that the Central government should commission a group of eminent scientists to 'find out scientific ways and means of solving the water shortage problem in the country'[10] and provide this group with the requisite financial, technical and

administrative help. In particular, the Court expected such a group to find out technical solutions for saline water conversion, utilising water in the form of ice, rain water and flood water.

In its final judgement, the Supreme Court opined that science and technological interventions alone can solve the problem of water scarcity by providing inexpensive methods for converting water into a usable potable form. It therefore gave the government a deadline of two months to form a Committee under the chairmanship of Secretary, Department of Science and Technology to address the water shortage problem. In response, a Committee was set up under the Secretary, DST and a Technology Mission—Winning, Augmentation and Renovation for water was launched focusing on interventions for winning water from sustainable resources, augmentation of quality of water from available and accessible sources, and renovation for recycle (Ministry of Science and Technology, 2009).

Two important points emerge from the judiciary's dealing of this case. First, although, the writ petition was for protection of wetlands, the Court *suo moto* expanded its scope and ruled for dealing with the acute water scarcity. Second, the Court relied on technological interventions to address the country's needs—an action that the executive had failed to take the lead in or perform. Recognising the role of technology in augmenting the supply and access to water, the Court held that scientific research in this area should be 'on a war footing' and the Committee should regard it as 'a patriotic duty'.[11] Another noteworthy aspect of the judgment is the manner in which it connects the domestic concerns and spaces with the global spheres. The Court took special note of the fact that all the available technological solutions prevalent internationally are highly expensive for large-scale deployment in India. Besides, it specifically called for connecting with Indian diaspora with expertise in this field, thus connecting with the global developments in science and technology.

Another example of how the judiciary has intervened and promoted a technical solution when the executive seem to have abdicated from its responsibility is the famous compressed natural gas (CNG) case (M.C. Mehta vs Union of India and Others, Supreme Court Judgement dated 28 July 1998).

Mr M. C. Mehta, a well-known environmental activist and somebody who has filed numerous public interest litigations in India; had approached the Supreme Court pleading for the proper implementation of the Air Act, 1981 in Delhi to address rising levels of vehicular pollution contributing to falling air quality levels. The Court issued notices to various departments of the state government of Delhi including the Central Pollution Control Board. The failure on the part of government agencies to take any adequate steps led to the Court ordering the setting up of an Authority to get more information about the issue—the Bhure Lal Committee was constituted by an order of the Court and appointed vide a gazette notification on 28 January 1998.

Amongst several others, one recommendation made by the Bhure Lal Committee was the steady conversion of the New Delhi city bus fleet to CNG by 31 March 2001. The Supreme Court gave effect to this recommendation of the Bhure Lal

Committee and mandated that the bus fleet be converted to CNG before the said deadline.[12] The reliability and practicability of CNG was questioned on the basis of its efficacy, safety and cost by both the government and existing transport operators (Rosencranz and Jackson, 2003). The other opposition to the court ruling was, of course, on the ground of stepping on the executive's domain as the court did not direct the executive to take action but mandated the conversion of the fleet based on a Committee's findings. However, it must be remembered that the Court did not devise or come up with the CNG option on its own (Narain and Greenspan, 2005); it picked up and took forward a technological option proposed by an expert committee to further the purpose of reducing pollution of air on account of vehicles in the city of Delhi. Thus in effect, it may have pushed for a particular technological option, but the real thrust was to address the problem of vehicular pollution in Delhi through the options available and recommended.

It is interesting to note repeated instances in which the Supreme Court has played a decisive role in displaying clear preferences for opting for specific technological interventions to address governance problems, this despite its oft reiterated lack the technical competence to choose between divergent regulatory choices specifically in cases of regulation of environmental and health risks emanating from specific technologies.[13]

## Two Case Studies on Risk Regulation: GMO and Nuclear Technologies

The first is the case of Aruna Rodrigues & Ors. vs Union of India & Ors. This case was on the environmental risks pertaining to Genetically Modified Organisms (GMOs). Although there have been other litigations on specific approvals given by the GEAC and other related issues, this is a significant case because of two reasons. First, because the petition came up for hearing post the decision of the MOEF to impose a moratorium on the commercial release of Bt-Brinjal, and therefore the Court was operating in a climate where there was considerable public knowledge and civil society activism on the risks emanating from the use of such technologies. Second, this petition was unprecedented in terms of its prayer. It pleaded with the Court to direct the MOEF to completely overhaul the current regulatory system that was institutionalised in the form of the GEAC. It argued that the current regulatory system was weak and ineffective and therefore required drastic restructuring and till that was done all regulatory decisions should be put in abeyance.

The petitioners were civil society activists who filed a public interest litigation under Art. 32 and approached the Supreme Court with the plea that a protocol be developed that shall scientifically examine all relevant bio-safety aspects before the release of GMOs, and till the time that such a protocol is put into place to put a moratorium on the import, manufacture and usage of all GMOs. The petitioner alleged that the current regulatory framework was inadequate and pending an overhaul of the current framework, all approvals for testing should be stopped.

Admitting the demands of the petitioner for the constitution of an independent technical committee of experts since the petitioner was challenging the current regulatory structure manned by the MOEF, the Court constituted a 'Technical Expert Committee' (TEC) comprising of current and retired scientists from public universities and research centres with terms of reference that included a thorough evaluation of the current regulatory structure and the adequacy of the ongoing field travels and recommendations for institutional reform. Importantly the Court expressly allowed the TEC to review reports or studies authored by scientific experts in India and internationally and also to hear and consider the opinion of both the parties as well as other interveners.

The Committee submitted an interim report in October 2012 in which it had suggested a ten-year moratorium on the field trials of Bt-transgenic in all food crops (Jishnu, 2012). Following this, bodies such as the Foundation for Biotechnology Awareness and Education (FBAE) and industry leaders like Kiran Mazumdar Shaw, Chairman and Managing Director, Biocon Ltd. had expressed grave reservations about these interim recommendations (Jha, 2012). The Ministry of Agriculture, Government of India also criticised the recommendations and intervened in the case pleading that the TEC should be reconstituted. It suggested the name of former Director General of the Indian Agricultural Research Institute, Dr Rajendra Paroda as its nominee (it argued that an agricultural scientist was missing from the panel) in the TEC. Although there were reports of major conflicts of interest in the case of Dr Paroda (Chauhan, 2013), the Court accepted Dr Paroda as the sixth member of the TEC.

The TEC submitted its final report to the Court on 30 June 2013[14] where, although it did not reiterate its initial recommendations, the tone and tenor of the report remained the same. It underlined that 'there are major gaps in the regulatory system. This needs to be addressed before issued related to tests can be meaningfully considered. Till such time it would not be advisable to conduct more field trials'.

Apart from the obvious redress of individual conflicts of interest, the TEC also recommended that institutional conflicts of interest should be addressed by locating the regulatory bodies in the MOEF and the MOHFW rather than in the DBT, since the latter is tasked with the objective of promoting biotechnology as distinct from the MOEF and the MOHFW, which regulate environmental and health risks across sectors. It therefore clearly opted for horizontal regulators rather than those with domain knowledge but lacking expertise on risk regulation.

The TEC noted that worldwide Bt-transgenics are used in soybean, corn, cotton and canola—all crops which are primarily used for oil or cattle feed. It therefore saw no compelling reason why India should be the first to consume Bt-transgenics through major food crops without long-term safety data on the impact of Bt-trangenics on food crops. The TEC also noted that India today was not facing a similar food shortage like in the 1960s and therefore there was no justification for release of GM crops for which India is a centre of origin or diversity (as it was the case in Bt-Brinjal). Interestingly the TEC also recommended close collaboration with Norway as it would help in developing a state-of-the-art bio-safety regulatory

system that was sensitive to the evaluation of socio-economic impacts—a dimension that it identified as critical to risk evaluation in the context of developing countries like India (Rajalakshmi, 2013).

The primary recommendation of the TEC to completely overhaul the existing regulatory institution was, in fact, in concurrence with the findings and recommendations of the Thirty Seventh Report of the Parliamentary Committee on Agriculture (PCA) on 'Cultivation of Genetically Modified Food Crops—Prospects and Effects'' which was tabled in the Lok Sabha in August 2012.[15] The report of the PCA criticised the functioning of the GEAC and recommended a complete institutional overhaul of the system with the aim of ensuring transparency and accountability in decision-making.

The Court is currently considering the final TEC report and has asked the government of India and the petitioners to file their responses, following which it is expected to decide on the matter before the end of 2013.

The second is the case of G. Sundarrajan vs Union of India & Ors,[16] where the primary issue was the environment and health safety concerns with the commissioning of the Kudankulam Nuclear Power Plant (KKNPP) Units 1 to 6. Mr Sundarrajan is an engineering graduate in Electronics and Instrumentation and a trustee of a public trust—'Poovulagin Nanbargal'—which works on environmental and other related issues. He filed a writ petition in the Madras High Court seeking a 'fresh and transparent review of the KKNPP at Kudankulam, Tirunelveli District, Tamil Nadu by an independent body of experts…by holding public hearings in accordance with law and till such time not to commission the project and also not to commission the same without fresh Environment Impact Assessment and Coastal Regulation Zone clearance' (Paragraph 2.1, G. Sundarrajan vs Union of India and Others, W.P.No. 24770 of 2011).

The petitioner also referred to the nuclear disaster at the Fukushima Nuclear Plant, Japan in March 2011 in order to underline the scale of cleanup that is required (as per experts approximately 20 years is the time required before residents can inhabit the area). He also referred to the government Task Force on Safety Evaluation of the Systems of KKNPP and that commissioning of the power plant should not take place before the submission of the report of the Task Force.

The Madras High Court, relying on the affidavits submitted by the MOEF, AERB, Tamil Nadu Pollution Control Board (TCPCB) and the Department of Atomic Energy and also that of the opinion of Dr A.P.J. Abdul Kalam (former President of India and an eminent scientist) dismissed the writ petition and held that:

> By taking note of the overall situation explained in detail, we are of the view that the KKNPP in respect of Units 1 and 2 do not suffer from any infirmities either for want of any clearance from any of the authorities, including the MoEF, AERB, TNPCB, and the Department of Atomic Energy, and there is absolutely no impediment for the NPCIL to proceed with the project. However, it is made clear that all the above said regulatory authorities shall periodically oversee the

> compliance and maintenance of standards of pollution, etc., as contemplated under law. It is also made clear that the Government of Tamil Nadu, through the District Collector, Tirunelveli, shall take appropriate steps for the purpose of conducting off-shore drill periodically in all villages by involving not only the officials, but also public and also create awareness among the people. (Paragraph 108)

Mr Sundarrajan subsequently challenged the Madras High Court Judgement via a Special Leave Petition in the Supreme Court (S.L.P. (Civil) No. 27335 of 2012). The primary plea taken was that although the plant started to be established in 1988, however due to the subsequent agreement that the Government of India entered into with Russia in 1998, Units 1 and 2 of the KKNPP were to be treated as new units and therefore the 1994 Environment Impact Assessment Notification[17] was applicable and it had become necessary to conduct a public hearing (as per Notification S.O.318(E) dated 10.4.1997, whereby inter alia introduced Schedule IV into the 1994 Notification prescribing the procedure for public hearing). The petitioners argued that the KNNPP was in violation of the Coastal Regulation Zone Notification, 1991 since the plant was within 500 m of the High Tide Line, off the coast of Tamil Nadu in the Bay of Bengal—and therefore where economic and industrial activities were prohibited. And, although the CRZ Notification of 1991[18] did provide an exception to this rule—in terms of allowing those activities which necessarily required foreshore facilities—this was certainly not applicable in the case of KKNPP.

First the MOEF, countered the petitioner's charge by stating that '1994 (EIA) notification would not apply qua Units 1 & 2 in view of the fact that the environmental clearance was already granted in the year 1989'.Further, it also underlined that

> MoEF issued the CRZ Notification on 19.02.1991 imposing restrictions on the setting up and expansion of industries, operation or processes, etc., in the coastal zone. This notification, it was pointed out, did not prohibit the project already in operation, granted clearance prior to the date of the issue of Notification'. (Paragraphs116 and 117 of judgement of Supreme Court in G. Sundarrajan vs UOI and Others, S.L.P. (C) No. 27335 of 2012)

The Court stated the following while clarifying their view on the matter:

> While balancing the benefit of establishing KKNPP Units 1 to 6, with right to life and property and the protection of environment including marine life, we have to strike a balance, since the production of nuclear energy is of extreme importance for the economic growth of our country, alleviate poverty, generate employment, etc. While setting up a project of this nature, we have to have an overall view of larger public interest rather than smaller violation of right to life guaranteed under Article 21 of the Constitution. (Paragraph 175)

It further stated that:

> Public money running into crores and crores rupees have already been spent for the development, control and use of atomic energy for the welfare of the people and hence, we have to put up with such 'minor inconveniences', 'minor radiological detriments and 'minor environmental detriments' in our lives because the benefits we reap from KKNPP are enormous since Nuclear energy remains as an important element in India's energy mix which can replace a significant part of fossil fuels like coal, gas oil, etc. (Paragraph 180)

The Court thus dismissed the appeal.

There are striking similarities between these two cases discussed above in terms of the framing of the issue by the government and thereafter by the court. First, the government's response in the GMO case is primarily based on underlining the importance of GMO technology to economic development and that the moratorium will affect India's chances in harnessing this technology. This will mean that an opportunity is lost to encourage scientific research and apprehensions of brain drain. In the case of nuclear technology as well, it is apparent that the government bases it argument on the clear economic logic that nuclear energy is imperative for economic development. This is a reflection of the primacy of the national narrative.

The court interestingly agreed with the government in both the GMO and the nuclear technology cases and in the case of the latter devised a two part test (justification and the apprehension test). The framing of the test itself reveals the pervasive influence of the national narrative on the court's thinking. The utility of designing a justification test is presumably to elucidate on the role of a specific technology in national economic development. And if the justification test is met—then a way can be found to address the apprehensions—it is interesting that the court does not frame this as an issue of regulation of risk but in more colloquial and therefore dismissive term as 'apprehensions'. Apprehensions seem to allude to the presence of unknown fears with limited basis in fact whereas calculating risk would have been on a scientific basis.

While in the GMO case the Court stating its inadequacies set up a TEC—presumably to provide clear cut scientific basis for taking a regulatory decision—when it was faced with the interim recommendation of the TEC it chose to ignore it in favour of relying on government claims—claims which were not addressing the risk concerns but were essentially reiterating the national narrative and thereby suggesting that risk concerns should be ignored or at best would be dealt with at some unspecified future date.

The other important issue is that of civil society interventions in technology regulation. In the GMO case the Court was confronted by sufficient scientific evidence on the risk issues surrounding GMOs also there was already a moratorium in place on Bt-Brinjal which would have lent credence to the demands of the petitioners. This partially explains the court's acceptance of their demand to establish a technical committee of experts to investigate the issue. However by ignoring the

interim recommendations of the TEC, the Court seems to privilege that 'belief' of the Government that GMO technology is important for national development. It would be interesting to see the Court's reaction to the final report of the TEC.

In the case of the nuclear technology the Court is even more emphatic in accepting and reiterating the importance in national development and rejects the demands of the petitioners as not 'scientific'. Both these cases reflect the attitude of the Court to civil society interventions—as something that is not based on technical expertise. The government, on the other hand, is taken on face value as having the technical competence and therefore the ability to address risk issues. Even if their conduct has been contrary to the public expectations—thus the court views civil society interventions as something that is first not based on technical competence and therefore is easily ignored in favour of the national narrative. Thus the Court seems to be weighing against the democratisation of science in general and the penumbra of science policy and regulatory decision-making that shape technology development in India (Kleinman, 1998).

## Conclusion

One of the most effective powers of the court is that of judicial review of the legality of government laws and policies. There are three specific grounds on which public authority can be challenged by the court: illegality, irrationality and procedural impropriety.[19] The Supreme Court has used its power extensively. However in the context of environmental and health risks emanating from technology, the Supreme Court has reiterated its lack of competence on technical expertise and used this as a ground to defer to the State. Thus in both the cases—nuclear technology and GMOs—the court seems to have shown an unusual deference to the vision of national development which the state has held to be synonymous with the development of specific technologies. This deference has even extended to the disregard and attempts by the Court to delegitimize civil society voices that have pursued public interest litigations in their bid to shape technology development. The Supreme Court therefore stands today as an actor that has consumed and is therefore subsumed by the national narrative. This is also evident from its proclivity to privilege technology based solutions to social problems which the government has consistently faced to address. This being a case study of limited number of cases, the conclusions are tentative. It is necessary to study a larger number of such cases to come to a deeper understanding of the role of the Supreme Court in technology governance in India.

The limited aim of this article is to problematise and promote a deeper engagement with the role of law as a constitutive force in shaping technological dimensions and developments in India. As mentioned earlier, the science and technology studies as an area studies domain has studied law from a limited (and slightly mechanical) perspective—law is only a mechanism through which social choices vis-à-vis technologies are implemented. As is evident from the discussion above, this is not necessarily the case. In the case of India, where governance choices of public

investment in specific technologies are driven by governmental departments and politicians—civil society organisations have sought the courts as a neutral forum to access such decisions and open them up for public scrutiny. On the other hand the courts, as governance institutions, themselves reflect the national narrative on science and technology being the harbinger of economic development—by displaying a propensity to pursue technological solutions to social problems. These two dimensions of the role of the court illustrate the complex nature of the role of law and legal institutions in shaping technology and therefore underline the need to broaden this research agenda of which this article is only a first step.

## NOTES

1. Recently the Government of India announced the 12th Five Year Plan Budget which is 2.5 times higher than the budget allocated in the 11th Five Year Plan See, Jayaraman (2012).
2. These include the following: National Metallurgical Laboratory, Jamshedpur; Fuel Research Institute, Jealgora; Central Food Technological Research Institute, Mysore; Central Drug Research Institute, Lucknow; Central Glass and Ceramics Research Institute, Calcutta; Central Road Research Institute, Delhi; Central Building Research Institute, Roorkee; Central Leather Research Institute, Madras; and Central Electro-chemical Research Institute, Karaikudi.
3. The science and technology (S&T) departments functioning under the auspices of central government include: Department of Science and Technology (DST), Department of Scientific and Industrial Research (DSIR), Department of Atomic Energy (DAE), Department of Space (DoS), Department of Biotechnology (DBT) and Department of Ocean Development (DOD). Apart from these, the Defence Research and Development Organisation (DRDO) under the Ministry of Defence, the Indian Council of Agricultural Research (ICAR) under the Ministry of Agriculture and Indian Council of Medical Research (ICMR) under the Ministry of Health and Family Welfare have a large R&D infrastructure. See http://dst.gov.in/stsysindia/about-sys.htm for details of the public organisation landscape of S&T in India.
4. A periodic safety audit of all atomic power plants in India is carried out by the AERB. All nuclear power projects undergo an elaborate in-depth safety review during the consenting stages, namely, siting, construction, commissioning, etc. After a satisfactory review during the project stage, AERB issues an operating licence to a nuclear power plant for a period of up to five years. During the license period, nuclear power plants are under regulatory surveillance and their safety performance is continuously monitored in compliance with prescribed guidelines. A minimum of two regulatory inspections of each nuclear power plant are also carried out in a year to verify compliance with various safety requirements. A consolidated safety assessment of the plant is undertaken while renewing the operating license. See information provided in response to Question No. 466 by Shri Shadi Lal Batra, Rajya Sabha Secretariat, 8 August 2013. See http://164.100.47.4/newrsquestion/ShowQn.aspx
5. See information provided in response to Question No. 628 by Shri A Elavarasan, Rajya Sabha Secretrariat, 29 November 2012. See http://www.dae.nic.in/writereaddata/parl/rsus628.pdf
6. See for instance the numerous public interest litigations filed by Gene Campaign (an NGO working on food security issues) http://genecampaign.org/legal_actions.php
7. See MOEF Decision on Commercialization of Bt-Brinjal. 9 February 2010. http://moef.nic.in/downloads/public-information/minister_REPORT.pdf
8. AIR 1993 Cal. 215, 97 CWN 142.
9. *M.K. Balakrishnan vs Union of India and others*, WP (civil) no. 230 of 2001, Order dated 26 March 2009.
10. *State of Orissa vs Government of India & Another*, WP (Civil) No. 443 of 2006, Order dated 6 February 2009.

11. See *supra note* 10.
12. *M.C. Mehta vs Union of India*, W.P. (C) No. 13029 of 1985 (with W.P. No. 939 of 1996) Order dated 28 July 1998.
13. In *Aruna Rodrigues & Ors. vs Union of India & Ors* (2012 AIR SCW 3340), the Court stated: 'It is obvious that such technical matters can hardly be the subject matter of judicial review. The Court has no expertise to determine such an issue, which, besides being a scientific question would have very serious and far reaching consequences'. See also Justice D. M. Dharmadhikari, 'Development and implementation of environmental law in India', (undated) IUCN database. Retrieved on 4 June 2013 from http://data.iucn.org/dbtw-wpd/html/EPLP-060/section7.html
14. Final Report of the Technical Expert Committee, submitted to the Supreme Court of India in the case Aruna Rodrigues and Others vs Union of India (WRIT PETITION (CIVIL ) NO. 260 OF 2005).
15. Parliamentary Committee on Agriculture (2011–2012), Fifteenth Lok Sabha Ministry of Agriculture (Department of Agriculture and Cooperation). Retrieved from http://164.100.47.134/lsscommittee/Agriculture/GM_Report.pdf
16. 2013 AIR SCW 4019.
17. The Environment Impact Assessment Notification was first issued by the Government of India in 1994 under the Environment Protection Act 1986. The objective of EIA is to understand and address potential environmental impacts at an early stage of any economic/industrial project. The EIA exercise allows stakeholders (affected and interested parties) to understand the potential environmental impact of the project and to help design mitigation measures.
18. MoEF in exercise of powers conferred under Section 3(i) and 3(2) (v) of the Environmental (Protection) Act, 1986 and Rule 5(3)(d) of the Environmental (Protection) Rules, 1986 issued a Notification dated 19 February 1991 declaring coastal stretches as coastal stretches of seas, backwaters, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) up to 500 m from the High Tide Line and the land between the low tide line (LTL) and the HTL are called coastal regulation zone and both prohibited and permitted activities so as to the ensure protection of marine life and reducing environmental pollution.
19. Sterlite Industries (India) Ltd. vs Union of India (2013 AIR SCW 3231).

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