# The roots of the crisis in the seed industry

For many decades, the Indian policy framework facilitated the interaction of science and innovation with entrepreneurship, which led to competition and the subsequent development of an industry structure that delivered sustainable economic benefits.

The government was a major contributor to investments in seed research in India for close to three decades after independence. Policy reforms like the New Policy On Seed Development (1988) and New Industrial Policy (1991), and advances made by science and technology, provided an impetus to the participation of the private sector in the Indian seed industry and private investments helped India benefit from hybrid seed technology and biotechnology.

However, according to the Rabobank report (2006), India's top 10 seed firms accounted for just 25% of the total volume of seeds sold by the private sector in 2005. This level of fragmentation was aided by the low entry barriers. Historically, intellectual property (IP) had no sanctity in the industry. Some of the staff of seed companies had free access to the most vital intellectual property of the company, i.e. the germ plasm and the parent lines. People could easily start a new seed company with the freely available parent lines. Many seed-producing farmers also set up seed production companies.

Consequently, research investment by private companies remained at a meagre 3-4% of revenue against the international norm of 10-12%. Investment by the public sector in seed research continued. A steady formal and informal flow of material from public institutions to private entrepreneurs continued.

There was no IP law for the seed industry till The Protection of Plant Varieties and Farmers' Rights Act (PPVFRA), 2001, came about. In the preamble to the Act, the government said this law was intended to promote research in, and creation of, intellectual property in the seed sector.

In a 2014 paper by David Spielman et al, it is argued that science, technology and innovation play a central role in driving change in the industry. Adoption of new technology leads to the creative destruction of old players and systems, pushing forward technological frontiers.

They quote Joseph Schumpeter (1934), who posited that innovation by large firms through temporary monopolies or other forms of market power leads to technological reforms and appropriate gains, albeit with short-term consequences for social welfare. In the long run, technological change and economic growth result from the continuous entry and exit of entrepreneurs who innovate on production processes and secure advantages that force the exit of older, obsolete firms from the market.

This is an accurate conceptual summary of the impact created by genetically modified (GM) seeds technology, which disrupted the existing industry structure in India. Forty-five Indian seed companies got a licence to use the technology and participated in the explosion in the Indian cotton market. These changes led to a temporary monopoly for the technology provider but the policy framework had the opportunity to help society reap long-term economic benefit by enabling the industry to absorb and exploit the new technology. Sadly, the policies of the Central and state governments fell short of the required visionary approach.

First, no steps were taken to encourage competition in the sector. Existing technology providers continued to enjoy a monopoly. Second, the government stifled further research investment by controlling prices, dictating licensing terms and confusing IP laws between different Acts. Third, timely actions were not taken to prevent the illegal introduction of GM technology into the market.

In the process, the government killed the second part of the theory proposed by Schumpeter. It failed to clearly articulate the industry structure it wants to promote and the roles of the different stakeholders it would like to establish. Political posturing prevailed and they did not understand the long-term impact of the confusion they created.

There are some actions that the government has to undertake quickly:

1. A quick and decisive action in collaboration with state governments to identify and take over fields where illegal GM cotton is being grown.

2. Agree on a national policy on GM crops, define the exact areas where GM is required by the country and where the government will encourage public and private investment in GM technology. This will bring greater clarity and remove the current policy paralysis.

3. A quick resolution to the conflicts between the different IP laws that are affecting this industry and clearly defining how the government wants to encourage research investment with assured IP protection in this important sector.

4. Invest in educating the public about the facts regarding GM technology and stress on its critical role in enhancing agriculture productivity and its benefits to farmers and consumers.

5. Strengthening the regulatory mechanism for the seed and biotech industry to make it transparent, science-based, predictable and fair.

These actions will bring back normalcy and establish predictability in the system. The implications of not doing so could be very damaging to the seed and biotech industry, with the Indian farmer and the consumer being the ultimate losers.

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