Lokmanya's Swadeshi for the 21st Century India

by

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Lokmanya Tilak has been described as `the architect of Indian nationalism'. His love for his motherland, the values that he firmly stood for and his sacrifices for the nation with total selflessness have all been sources of inspiration for generations. The world has recognized him as a great scholar-philosopher and an icon of fearless and ideal journalism.

Human history has shown that inspiring words have the power of galvanizing the society, indeed the nation. On 1 June,1916, Lokmanya Tilak uttered his inspiring words `Swaraj is my birthright. And I shall have it'. Such words, especially as they came from an iconic `Lokmanya' leader, stirred the entire nation.

While celebrating the centenary of this seminal moment in the history of India, we must reflect on the four key goals that Lokmanya set for India. These were swaraj, swadeshi, boycott and national education.

Out of these four, the twin movements of `swadeshi' and `boycott' inspired by Tilak were aimed at generating indigenous and independent economic development. Boycott meant determined opposition to foreign goods, whereas swadeshi supported indigenous production.

Tilak's strategic thinking

Tilak was critical of the British Government for ruthlessly exploiting the resources of the country. He felt that Britishers' reckless policies had allowed free inflow of foreign goods making Indian industry face an unequal competition, thereby destroying the indigenous industries, trade and commerce.

Tilak was deeply concerned by the fact that simple things like matches had to be imported. He once said `During the whole of this century we have not known how a match is prepared. In Sholapur, matches are manufactured from straw, and straw is found abundantly in our country. If therefore this industry is taken into our hands the importation of matches will largely decrease in India'.

Tilak was similarly concerned by the importation of sugar. To quote him again. `It is the same with the sugar industry, we can procure here as good sugarcane as is found in Mauritius. It is seen by scientific experiments that the sugarcane found in the suburbs of Pune can produce as much sugar as is found in the sugarcane of Mauritius. Six crores of rupees are drained out every year from this country only for sugar. Why should this be? Well, can we not get sugarcane here? Or the machinery necessary for its manufacture?'

At the same time, Tilak had realized that a foreign government will not ever give protection to indigenous industry. That is why his way of creating a robust and sustainable economic development was fighting with the twin weapons of `swadeshi', which supported indigenous production and `boycott', which meant opposition to foreign goods.

India in Lokmanya's time imported even matches and sugar. Today's India makes everything from pins to missiles. The current Government's `make in India' mission resonates well with Lokmanya's clarion call for swadeshi, albeit in a dramatically changed globalised world.

From `Swadeshi' to `Make in India':Raising the Bar

India needs to have `sustainable job led growth' rather than `unsustainable jobless growth'. That is its first priority. `Make in India' mission should help in this. But for a nation, that is technologically advanced, it needs to raise its ambition. Let me explain.

I-phones are manufactured in China by Foxconn. Some 4.5 million jobs are created. For every i-phone that is sold, Foxconn takes away a profit of 10 US dollars. But Apple takes away a profit of 350 US dollars! So we have three possible models.

The first is value creation by brawn alone. Take away 10 US dollars per i-phone, but create 4.5 million jobs.

The second is value creation by brain. Take away 350 US dollars per i-phone but create very few (technology) jobs.

The third is the value creation through both brawn and brain. Take away 10 US dollars per i-phone, create 4.5 million jobs, and at the same time take away 350 US dollars per i-phone!

In other words, what I propose is `make in India' that is firmly founded on Indian science and technology led innovation created in India[2]. That, to me, should be the true manifestation of the spirit of swadeshi enunciated by Lokmanya Tilak in the present day India.

The way forward

The success of today's advanced industrialised countries is due to their history of science and technology adding value to their natural resources, be they physical or human. Of course, success is assured only if robust institutions, trade and an innovation eco-system in present.

This essay will deal with India's journey in the science, technology and innovation led industrial growth and consequent wealth and welfare creation. It will then spell out India's options reflecting on both technonationalism and technolglobalism in the Indian context. It will then reflect on the changing global context as globalization recedes and protectionism is threatening to take over. The strategic way forward for India will be finally discussed.

India's options

What are the options before India as far as technology is concerned? Simply put, there are five options[1].

The first is to `make'.
The second is to `buy'.
The third is to `buy to make better'.
The fourth is to `make to buy better.
The fifth is to `make it together'.

Let me explain each one of these.

The `Make' option

Fredrico Mayor, the Director General of UNESCO made an interesting statement in a TWAS meeting in `Trieste'. He said "Knowledge flows from north to south and wisdom flows from south to north". I remember making a small correction; 'knowledge' may flow from north to south but 'monetisable knowledge' does not flow that easily from north to south, since usable knowledge has the potential to create wealth. No country gives a competitive advantage to another, excepting at a price.

In the absence of foreign exchange and also denial of technology, ‘make’ had been a preferred course of action for India. We made everything from mundane to advanced products, all indigeneously. And this was in spirit of the swadeshi that Lokmanya Tilak had talked about.

The `Buy’ option

`Buying’ is the second option. However, 'buying’ the knowledge embedded in a technology or a machinery is possible, only when the owner is willing to part with it. The experience has been that when Mark III technologies have been developed by the owner, he often only Mark II and one is finally lucky to get Mark I.

Nations like India are not necessarily being looked at as a bottomless pits of demand by the firms in the developed world. Technology buyers from such countries are being seen as potential competitors in the world market. Therefore technology sales are invariably conditioned with marketing territory restrictions. The age of straightforward technology licensing agreements is giving way to technology-cum-market, technology-cum-stakeholding, technology-cum-product swap, etc. Technology is available to a buyer only if it fits in with the supplier’s global scheme.

The `Buying to make better’ option

Smart countries like Japan opted for the third option of `buying to make better’ route. They acquired knowledge through licensing (e.g. Sony buying the transistor patents from US) absorbed it and developed superior products, which competed with the best in the world. In recent years, China has taken to this option. Technology absorption strategy was interwoven (explicitly not implicitly) by China, into its policy right at the time the foreign investor came in. So China would say, we only import once’. India did not do that so well through a strong policy framework. We kept on buying and buying. This needs to change.

The `Make to buy better' option

The fourth option of `making to buy better' requires strategic thinking and planning. After all, strength respects strength. Deep specialized domain knowledge acquired by indigeneous sustainable technology development efforts leads to a mastery of a technology domain and a clear ability to deep dive into technology options. It then gives one an advantage in negotiations, strategic positioning and so on. It is only then that one can negotiate for Mart III and get Mark III from a position of strength, not just Mark II or Mark I!

The `Make it together' option

The fifth option is `making it together', when different actors and stake holders across the nation come together to build a new technology. This involves public-private partnerships. US leadership in semiconductor technology is a good example of this. New Millennium Indian Technology Leadership Initiative[2] launched by CSIR in the year 2000 is an example, where over 100 private sector Companies and over 200 public institutions partnered together to create new technologies., some of them being real breakthroughs.

Technonationalism

Tilak, as was remarked at the beginning, was considered the architect of Indian nationalism. Technonationalism is a special form of nationalism. Soon after independence, India had to follow the path of technonationalism, as access to global technology was hard to come by for a variety of reasons, as will be explained later.

In technonationalism, the focus is laid on protecting national interest linked to economy and security through indigenous development, accessing foreign technology and then its rapid assimilation rather than a mutual exchange with other nations.[3-5]

It is not just India, but many other nations have earlier tended to resort to "technonationalism". Countries in continental Europe did exactly the same thing after the advent of the Industrial revolution in England; Japan did it immediately after the Meiji Restoration, while Taiwan and South Korea followed suit in the late 1960's. Many nations placed emphasis on projecting national power and status – just as Soviet Union did before its break-up.

Nations like South Africa had to adopt to technonationalism, since during the apartheid regime, there were wide ranging sanctions imposed on it. Lack of access to oil forced them to create synthetic fuels based on coal by developing Fischer Tropsch technologies.

China in recent times has pursued technonationalism vigorously[6]. Since China's accession to World Trade Organisation (WTO) in 2001, China used standards as an effective instrument to protect and promote domestic industry in the Information and Communication Technology (ICT) sector. China made efforts to set its own technological standards – different from international standards – within not only its own territory but also worldwide.

Indian Technonationalism

India's technology denial challenge ranged from a high performance supercomputer to cryogenic engine used in the space launch vehicles. When technology was not available for love or for money, the only option for India was developing the technology on its own. There was no other option for India but to follow the path of technonationalism.

It was through the path of technonationalism that India developed self-reliance through its own technologies in space, defence, nuclear energy, and supercomputers, among others. Let me illustrate.

Take India's defence research infrastructure. India has developed diverse missiles and rocket systems, remotely piloted vehicles, and then one is so proud to see the recently

inducted light combat aircraft, Tejas and so on. Brahmos is a great example of Indian progress. None of these technologies were available to India for love or for money.

Look at our forays into nuclear S&T. The entire range of technologies, from the prospecting of raw materials to the design and construction of large nuclear reactors was developed on a self-reliant basis. India's nuclear fast-breeder reactors emerged from its thrust towards technonationalism. The Indo-American nuclear deal would not have been signed, if India had not positioned it from the position of strength this way.

And the recent crowning glory of India's space research has been a matter of pride for all the Indians. India's first moon orbiter project Chandrayan-1, Mars Orbiter Mission or even the recent simultaneous launch of 20 satellites are brilliant examples. India just celebrated the century of its satellite launch. No wonder, India is now ranked amongst handful of nations of the world that have a credible capability in space S&T.

Indian Technonationalism and Export Control Regimes

Technonationalism is not only driven by nationalism per se but also driven by technology denial. Technology denial over the years has been affected through several instruments such as Wassenar Arrangement, Nuclear Suppliers Group, Australia Group, Missile Technology Control Group, etc.

But the denial regime itself undergoes a change as technonationalism gives the country a strong technological foundation. It is important to remember that it was in 2008, that India signed a key civil nuclear deal with the US in 2008, which gave it some access to nuclear materials and technology. Recently, India become a member of Missile Technology Control Regime (MTCR). As a member of MTCR, it will have access to crucial missile technologies. India's efforts to become a member of Nuclear Suppliers Groups, which would have given it access to nuclear energy technology have to wait though.

It is the growing technological strength of a nation that increases its access to technology that has been denied to it. The best example of this is India's forays into supercomputers. Mashelkar[3] has explained this super computer saga in his essay on the story of India's denial driven innovation.

India's supercomputer journey began, when access to CRAY super computer was denied to India in mid-eighties. India's response was to launch the Centre for Development of Advanced Computing (C-DAC) in 1987. In 1991, India developed its first supercomputer, PARAM 8000.

PARAM, incidentally, was built at a cost that was less than the cost of the imported CRAY computer! It was also built in a time that was less than the time it would have taken to import and install a large computer system in India at that time!

But PARAM by C-DAC was not the only response by India to technology denial. There was 'Flowsolver' by National Aerospace Laboratories (NAL), ANUPAM by Bhabha Atomic Research Centre (BARC), and ANURAG by Defence Research and Development Organization (DRDO).

The long voyage in high-performance computing was not smooth though. It had to take many challenges including embargoes on critical components, architectural debates, make-versus-buy debates, loss of top talent to multinationals, and several bureaucratic hurdles.

C-DAC's success in successful demonstration of PARAM-8000 in 1990 led to a policy change! The Los Alamos (Worlton) report concluded that supercomputers were not necessary to design nuclear weapons.

In 1991–1992, C-DAC exported its PARAM supercomputers to Canada, Germany, and Russia, while others, such as NAL's FLOSOLVER Mk III, and DRDOs' PACE, matched the capabilities of US-made, mid-range workstations.

In December 1992, the US Office of Naval Research sent an official to Bangalore to assess Indian capabilities in supercomputing. In 1993, the US authorized the licensed conditional export of high-performance computers to several Indian institutions.

In April 1995, India placed parallel processing supercomputing on its list of items requiring an Indian export license. In July 1995, the US began to review its supercomputers export controls and in October 1995, further relaxed the export of computers to India.

In 1998, C-DAC launched PARAM 10,000, which demonstrated India's capacity to build 100-gigaflop machines. In response, the US further relaxed its export controls.

During the same year, CRAY established a subsidiary in India. Paradoxically the same company had denied CRAY supercomputers in 1980s!

The lessons are clear. There is no substitute to demonstrating the technological muscle. Reclamations followed and the route to gradual access open up.

Globalisation of Trade and Technology

We have so far discussed India's forays into technonationalism in both industrial and strategic sectors. Let's now consider the challenge of globalisation of trade and technology.

On 4 March, 1995, I gave[7] Lala Karam Chand Thapar Centenary Memorial Lecture titled *`India's Emergence as a Global R&D Platform: The New Challenges and Opportunities'*. We had the privilege of the then finance minister, Dr. Man Mohan Singh presiding over the lecture. I had then predicted the fundamental shift that was going to take place because of which the geography of science, technology and innovation was going to change. I had articulated the reasons as to why a country like India will become a global R&D hub over two decades ago. Today, that prediction has come true with over 1000

multinational R&D centers coming up in India employing over 200,000 scientists, engineers and technologists doing cutting edge research, design and development. But where did my confidence stem from?

I had then said[7] that the globalisation of R&D is closely linked to globalisation of business. This in term is linked to global competition of skills. The competitive advantage in high-technology business increasingly depends on underlying technical skills of the business rather than on particular products. As product life cycles keep on becoming shorter, skill-life cycles become longer. The product then is merely an intermediary between company's skills and the market it serves. Rather than being the focus of corporate activity, products are actually transient mechanisms by which the market derives value from a company's skill-base and the company derives value from the market. The high technology companies are therefore asking as to what skills, capabilities and technologies should they build up, rather than asking a stereotype question, as to which markets should they enter, and with which products.

Driving forces for globalization of R&D

Besides this fundamental shift in the dynamics, there are other driving forces[8].

The first is the increasing pressure to shorten global market penetration time for new products, and to decrease the `mind to marketplace' time span.

Second, innovation increasingly has multiple geographic and organizational sources of technology. R&D in high-technology industries such as information technology, biotechnology, nano technology, advanced materials had become highly science based. And the access to best of science was becoming distributed with new geographies of science emerging.

Third, the costs of doing R&D were also increasing exponentially. At the same time, there had been a progressive weakening of the importance of central corporate laboratories in

large firms. The world famous DuPont Corporate R&D Centre, which had given a trial blazing performance for several decades, for instance, is closed down. And so is the case with Bell labs. Firms worldwide were complimenting internal efforts by external technology partnerships on a global basis.

Fourth, the creation of seamless laboratories around the world was also being helped by the evolution of global information networks that allowed real-time management and operation of laboratories. Anytime, anywhere, any one had come to stay. Companies started aggressively gaining a competitive advantage by using global knowledge resources and working with a global time clock.

Firth, the trend was also fuelled by a shortage of R&D personnel in some emerging high-tech areas in industrialized countries. The demographic shift was taking place in the US, Europe, and Japan, as its population and workforce was becoming older.

Sixth, technoglobalism was becoming the way to go as global challenges demanded global partneships. The grand challenges included climate change, depleting fossil fuel resources, water crisis, global health challenges, etc. There was an increasing demand on technoglobalism directed towards creating a public good, or global good.

With all these powerful driving forces, technoglobalism moved with rapid acceleration over the last three decades.

Future of globalization and technoglobalism

The recent event, where Britain voted to exit EU (Brexit) has sent shock waves across the world. Among others, Larry Elliott, has written[9] an evocative piece *titled `Brexit is a rejection of globalisation'*. He asserted that EU has failed to protect its population from a global economic model that many believe is not working for them.

Elliott traces the history by saying that the age of globalisation began on the day the Berlin Wall came down in 1989. The trends on globalization of trade that were evident in the late 1970s were accelerated in 1980's. The free movement of capital, people and goods began. The effect of trickle-down economics was seen. A much diminished role for nation states started emerging. And there was a belief that market forces that were unleashed, were unstoppable.

But then there has been a pushback against globalization over the years, first with weak signals, and then came the stronger signals. The violent protects seen in Seattle during WTO meeting in 1999 were the first signals that there were rumbling voices against the march of globalization. Much discussion followed.

There were several thoughtful essays by global thought leaders. One by Niall Ferguson[10] on `Sinking Globalisation' as early as 2005 is worth reading.

But almost a decade later, concrete evidence about the decline of globalisation is emerging.

Since China began opening up its economy to the world at the end of the 1970s, its exports declined on an annual basis. In value terms, global trade declined in 2015.

When the global trade fell in 2009, the explanation was obvious: The world was experiencing a sharp contraction in GDP at the time. But how does one explain 2015?

The world economy grew in 2015 by a respectable 3%. Moreover, the trade barriers had also risen significantly anywhere, and transport costs kept falling, owing to the sharp decline in oil prices. So the global trade should have increased. But exactly the reverse happened.

The so-called Baltic Dry Index, which measures the cost of chartering the large ships that carry most long-distance trade has fallen to an all-time low. This indicates that markets

do not expect a recovery, meaning that the data from 2015 could herald a new age of slowing trade. The obvious conclusion is that the forces of globalization, once considered unstoppable are losing steam.

Experts are saying that there is time to rethink about the assumption that a flexible globalized economy can generate prosperity that can be widely shared. The flow of capital, goods, people and technologies is a prerequisite for prosperity. But what is also important is the need for the diffusion of prosperity amongst all, not just some privileged few. In this, there has been a failure.

There was a compelling idea about globalization. Martin Wolf[11] had defined globalization as a "journey, but towards an unreachable destination, the globalized world. A globalized economy in which neither distance for national borders impede economic transactions. A world where the cost of transport and communication were zero and the barriers created by differing national jurisdictions had vanished". Globalization was emerging as a very romantic notion, which embraced the social, cultural, and political interdependency of states. Globalisation also was supposed to refer to the integration and interaction between people and nations. But all this seems to be getting challenged.

The expectation was that global integration of trade and integration of technology will go hand in hand. The jury is now out as to this assumption will continue to hold as nationalism, and as a result, possibly even technonationalism, becomes the wave of the future. Seems unlikely to me. But in a volatile, uncertainty, complex and ambiguous (VUCA) world, anything is possible!

India's Future Strategy

India's future economic growth will be driven by growing domestic consumption, services and small businesses, including startups that will be hopefully led by science and technology led innovation. The Government of India must be applauded for not only

starting the `start-up India' movement but also backing it up with several welcome incentives.

Here is a five point agenda that needs to be followed up, especially in the case of S&T led innovation led start-ups[12-13].

1. Ideas need to be incubated. Therefore, we should build incubators across every Indian university, clusters of colleges, etc. These should be innovation clusters, which are sector specific, which bring all innovation players with domain expertise from academy, from industry, from finance, etc., together. There should be Research or Technology Parks in every city. They should be supported by strong public-private partnerships.

2. A conducive intellectual property rights regime needs to be designed and deployed. In the classical model, publicly funded academic research is done with a public interest character, whereas industrial in-house R&D is primarily done by industry for private good. In USA, the Bayh Dole act (1980) opened up the way for a new direction for the results of the basic research produced in academic institutions, by first creating the right of patent results of the publicly funded research and second, by granting these rights to exclusive licenses provided for profit firms, which could be the new start-ups also. The Research and Innovation Bill 2012, which deals with this issue in an India-centric view or even its modification needs to be passed urgently.

3. In science led innovation, when a new idea is born, which leads to the design and development of a new product, that the present market has not seen before, the ready provision of early stage financing is crucial. Risk financing in the form of venture capital, which acts as an intermediary for long term investment, and which supports young startups, becomes critical. Such `ad' venture capital created must support the young firms from their creation till they mature. We need more such `ad' venture capital.

4. The Government must create the support structures for creating the Indian leadership in science based innovation. That requires financial resource input as well as investments in capacity building. Patenting is expensive. So there must be dedicated national funds as well as special allocations to institutions. Skills in patent related endeavours are very special. For example, interpreting patent data for identifying the areas , where there is a freedom to operate, writing patents professionally so that the competitors will not easily bypass them, assessing the potential current and future value of an intellectual property, etc. are all highly professional jobs. We need to strengthen these.

5. Science based innovation will invariably lead to products that do not presently exist in the market. The Government must have tax exemption policies, excise duty reductions, policies to provide massive public procurement support for the early stage market seeding and market expansion of such products. It is laudable that the Government is making a conscious effort to make this happen.

If this is done, then we will create more job creators than job seekers. This will lead to job led growth. This will also lead to new Microsofts, Googles and Apples from India. That will lead to the model 3 that I described earlier. And that is the combination of brawn and brain for both creation of millions of jobs and also creation of wealth based on application of cutting edge world class Indian technology.

Finally

I want to end on a note on what has inspired me the most about the Lokmanya Tilk's messages that we all Indians should carry home on this great occasion. And they are two that I would like to highlight.

While in England, Tilak and barrister Baptista wrote a pamphlet on `self-determination'. The contents presented a forceful exposition on Tilak's political ideology. He emphasized there that the whole of India was *one nation* and there was *unity in diversity*. The pamphlet

made a scathing attack on the argument that England was the political trustee of India. `As a tree cannot grow in shade, so a nation cannot really prosper under an overshadowing trusteeship. Trustees are appointed for minors. India is not an infant nation, nor a primitive people; but the eldest brother in the family of man, noted for her philosophy and for being the home of religions that cover half of mankind.

The second is the reply to the felicitation given to him on his 61st day. Lokmanya Tilak was visibly moved by the feelings expressed at the felicitation function. He concluded by saying, `We should all work for our country without expecting any fruit for our efforts. I only wish that the urge to strive for swarajya gets uppermost in your minds and I pray to God that I may live to see the fulfilment of at least some of the aspirations cherished by you'.

Let the nation be inspired by Lokmanya's messages. These messages can be simply put.

One India.
My India.
India first.
Indian mattes to me, I want to matter to India, more.

Taking forward these inspiring messages of Lokmanya alone will make India claim its rightful position in the comity of nations, which is right at the top.

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