

Opinion

MONDAY, SEPTEMBER 16, 2019



DEAL OR NO DEAL
President of the US, Donald Trump
I see a lot of analysts are saying an interim deal, meaning we'll do pieces of it, the easy ones first. But there's no easy or hard. There's a deal or there's not a deal

Rational Expectations

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Vaping is bad, but bidis/gutka worse

Govt right to worry about e-cigarettes, but even now, it is focussing on the wrong thing; gutka/bidis are the real worry

THE JURY IS still out on whether the likely ban on e-cigarettes in India is a good idea; while a committee of experts had asked for this a few years ago, a Group of Ministers (GoM) has reportedly endorsed this, and a Cabinet nod is now required. Adding colour, but little else, to the debate over the pros and cons of vaping is the fact that some of those making the case for it are former WHO officials, who, for decades, swore that Big Tobacco was evil incarnate; their argument now is that technology has changed everything, and that vaping offers tobacco's kick with a lot less risk.

The pro-vaping lobby, interestingly, is under attack in the US for a 38% rise in the number of kids vaping (*bloom.bg/2md3z10*), but argues that, since e-cigarettes extract the nicotine from tobacco, they are a safer alternative to smoking cigarettes in much the same way that tobacco patches and nicotine gums are; it is the other carcinogens, and the tar from burning the tobacco, they argue, that is the killer. Interestingly, both FDA and CDC are investigating 450 possible lung illnesses—and six deaths—resulting from vaping.

Those opposing vaping, however, argue this is a partial view since nicotine is also carcinogenic; so, while many of the other 28 carcinogens in tobacco don't find their way into e-cigarettes, even a few are enough for them to be a health hazard. As for the argument that US studies show those who vape are twice as likely to quit smoking, some oncologists point out that the tests give just 2mg/day of nicotine to users, and with behavioural intervention; while the proportion of those quitting smoking doubled to 20%, e-cigarettes present a new kind of threat. For one, each cartridge has 10mg of nicotine, which is around a third of the minimum lethal dosage; presumably CDC-FDA will also shed more light on this aspect of vaping.

Also, with vaping marketed as a cool, and less-carcinogenic solution, as the US example shows, it can attract millions of non-smokers; and vaping hasn't been around long enough to get definitive studies on whether it is less carcinogenic. If a large number of new users get addicted to it, even if it is 'less' carcinogenic than smoking, this could be an even greater health hazard. Nor is it clear what 'less' really means; if one unit of a substance A (which is a carcinogen) is enough to cause damage, how is this safer than a formulation that has five units of A?

While it is presumed the GoM looked at both sides of the argument, since vaping is relatively new, it is unlikely there will be enough evidence—relative to that on conventional smoking—on either its pros or cons. Nor is it immediately clear that banning is going to help; more so, since the more harmful product, the conventional cigarette, can be sold freely. A better step would be to treat it—till there is clinching evidence to the contrary—like conventional cigarettes, and put restrictions on its sales near schools, ban ads, put statutory warnings on labels, ban its use in public places, etc.

The more serious problem, though, is that the government continues to get distracted by non-issues. Given what e-cigarettes cost, is this really the biggest health issue connected with tobacco usage in India? While only a very small proportion of smokers in India are likely to switch to e-cigarettes—unless there is a sharp cut in their prices—even now, India's anti-tobacco policy is solely focused on raising taxes on cigarettes to discourage their use. So, 80-85% of tobacco taxes are got from cigarettes—from ₹7,651 crore in FY06, cigarette taxes rose to ₹28,489 crore in FY17—whereas just 8-9% of all tobacco consumption is made via the cigarette route; this was around 21% in 1981-82. Indeed, according to the Tobacco Institute of India—a body of farmers, manufacturers, exporters, and ancillaries of the cigarettes' segment of the tobacco industry—cigarette duties are roughly 55 times those on other tobacco products, like *bidis* and *gutka*—₹5,478 per kg versus ₹99 per kg.

While it can be argued that *bidis* and *gutka* are used, primarily, by poor people, if the government thinks higher taxes on cigarettes will dissuade usage, surely the same strategy should be used for these products also? After all, while disease and death due to tobacco usage will hit all families equally, the economic impact will certainly be the highest for the poor. Interestingly, just around a fifth of the tobacco-related disease/death can be attributed to cigarettes, the rest is due to *bidis* and *gutka*. So, if the Cabinet does ban vaping, it will be celebrated as a big victory by the anti-tobacco groups, but it is really a distraction for a country like India, where the problem lies elsewhere. This ineffective policy is the reason why, despite continuous hiking of cigarette taxes, both the acreage as well as output of tobacco continue to rise instead of falling over time.

Low CREDIT

ADB report shows a global trade finance gap of \$1.5 trillion, with women entrepreneurs bearing the brunt

THE SIXTH EDITION of the Asian Development Bank's (ADB's) Trade Finance Gap, Growth, and Job Survey report shows a global trade finance gap of \$1.5 trillion. It stated that this gap is a roadblock to the realisation of the Sustainable Development Goals (SDGs), especially those pertaining to gender equality (SDG 5), and economic growth (SDG 8). Covering 336 firms from 68 countries, 112 banks from 47 countries, and 53 export agencies from 17 countries, the study finds that the large market gap in trade finance affects women entrepreneurs more than men. Women entrepreneurs' applications for trade finance saw a higher rejection—44% vs 38% for men. Further, 60% of women-owned firms were found to be less likely to apply for alternative financial support for trade after these rejections.

The lack of access to sufficient financing also impacted small and medium-sized businesses (SMEs)—45% of SMEs applications were rejected as compared to 17% of MNC applications. Around 76% of the banks surveyed stated that regulations, such as anti-money laundering (AML) and know-your-customer (KYC), have acted as major hurdles. The regulations do protect the global financial system from money laundering, and combat terrorism funding, but, as the report highlights, they inadvertently affect the growth of firms in lesser developed nations. To tackle this gap, the report suggests deployment of technologies like Big Data analysis, and blockchain, which most banks and enterprises do not adopt due to high costs, and the absence of a global standard for digital finance. Hence, ADB recommends adoption of common rules for e-commerce and digitised trade. Also, a digital code for legal entities looking to engage in financial and commercial transactions can be used. Access to trade finance needs to improve for women and SMEs if SDGs are to be met, and economic growth fostered.

FROM PLATE TO PLOUGH

GOVT MUST MAKE SCIENTIFIC CONCLUSIONS ABOUT ZERO-BUDGET NATURAL FARMING. AS PER INFORMATION AVAILABLE, ZBNF COULD CAUSE YIELDS OF MAJOR CROPS TO DROP BY 30-50%

Fertiliser reforms key, not ZBNF

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Views are personal



THE NARENDRA MODI government completed the first 100 days of its second term (Modi 2.0) last week. Most Cabinet ministers showcased what new and bold things they have done in their respective ministries. Media headlines, however, were filled with either the abrogation of Article 370, and its fall out, or the biggest ever slump in auto sales in the last two decades, or the slowing down of GDP growth to 5%. I was searching for any bold moves in agriculture as it affects the largest number of people. Frankly, I didn't find one. Surely, some tweaks in already-announced schemes, or some new ideas were thrown in, but without much backing of science, or resources. Let me pick a few of them for deeper dive.

PM-Kisan, promising ₹6,000/year to each farm family, was announced before the Parliamentary elections. In the 100 days of Modi 2.0, it was extended to all farming families. The 2019-20 Union budget has provisioned ₹75,000 crore for this. This is the first step towards direct cash (income) transfer to farmers' accounts. As I have argued earlier in this newspaper, this will be meaningful if other subsidies, such as those on food and fertiliser, power, irrigation, agri-credit, etc, are also clubbed with this and given directly to farmers, and then allowing the prices to be set by market forces. Else, it may be at the cost of investments in agriculture, which have already fallen from a peak of 18.2% of agri-GDP in 2011-12 to 13.7% in 2017-18. With such a fall in investments, the dream of doubling farmers' incomes by 2022 cannot be fulfilled.

But, here, I want to focus on something new and interesting that the prime minister talked of in his Independence Day speech, and later repeated in his address to the UN 14th Conference of Parties (COP14), in Greater Noida. The PM's key message was to reduce consumption of chemi-

cal fertilisers, and promote what is called Zero Budget Natural Farming (ZBNF). The ZBNF, fathered by Subhash Palekar, uses dung from *desi* black cows, their urine, adds jaggery and pulses flour in certain proportions, and uses that as *jeevamrit* to augment microbial activity in the soil. This is supposed to make our soils healthier, and augment productivity in a sustainable manner. Incidentally, ZBNF was also mentioned as the future of Indian agriculture by Nirmala Sitharaman in her maiden budget speech.

At the very outset, let me say that I am a supporter of adding any organic matter, be it dung, or farmyard manure (FYM), that can improve carbon in our soils. It is well-known that chemical fertilisers have not been used very rationally by our farmers. Although the optimal ratio of using nitrogen (N), phosphate (P), and potash (K), differs from plot to plot, at an all-India level, it is generally agreed that the optimal

combination of N, P, and K should be in the ratio of 4:2:1. In 2009-10, this NPK ratio was 4.3:2:1, quite close to the desired level. But, in 2010, the policy of Nutrient Based Subsidy (NBS) was introduced, whereby prices of P and K were almost freed, with some fixed subsidy on per tonne basis, but N (urea) was excluded from this scheme. As a result, while DAP and MOP carry a subsidy of about 25-30% of their costs of production, urea has a subsidy of more than 75% on its cost of production. Indian urea prices are perhaps the lowest in the world, and certainly lowest amongst major countries (see graphic).

No wonder, there is overuse of urea in relation to DAP and MOP. Normally, whenever chemical fertilisers are used, it is recommended to also use a good dosage of farm yard manure (FYM). So, FYM or *jeevamrit*-type stuff is conceived as a supplement to, not as a substitute of, chemical fertilisers.

But, if the government wants to

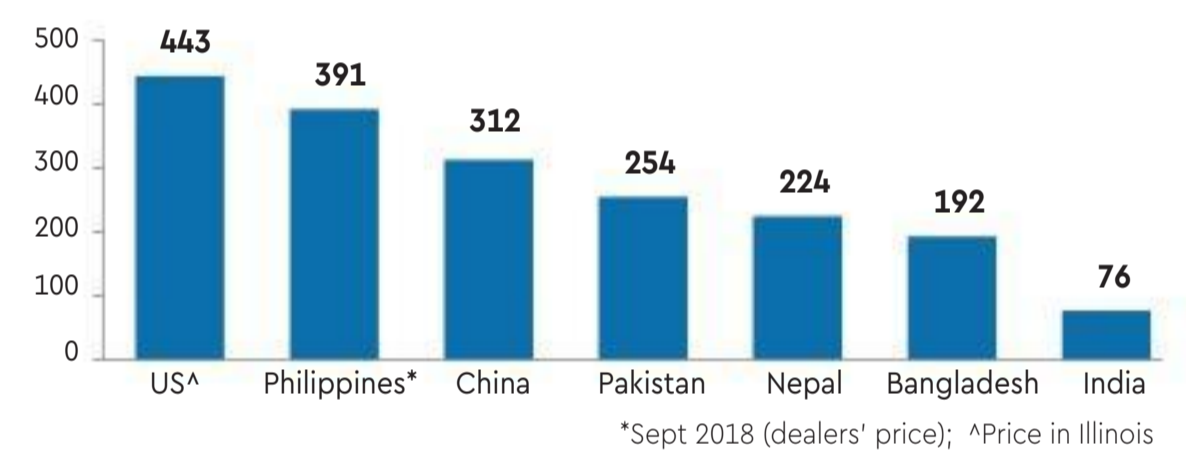
replace chemical fertilisers—the PM said in his "*Mann ki Baat*" of November 26, 2017, that he would like to halve fertiliser consumption by 2022—then it raises serious questions. First, has the scientific body of the government, the Indian Council of Agriculture Research (ICAR), studied the possible impact of ZBNF on yields of major crops, like wheat and rice, in comparison to chemical fertiliser-based farming? It needs to do large-scale testing in different regions to see the nationwide implications of ZBNF on overall production of major crops. I understand this has not been done yet, and the limited information available suggests a drop in yields from 30-50%! If so, it can puncture a big hole in India's food security basket. Do we want to go back to the 'ship-to-mouth' situation of the mid-1960s?

Second, if the PM wants to cut fertiliser consumption by half by 2022, why is the government investing in new urea plants under public sector—Gorakhpur (UP), Barauni (Bihar), Ramagundam (AP), Sindri (Jharkhand) and Talcher (Odisha)—of 1.27 million tonnes each. Together, this amounts to 6.35 million tonnes, the production cost of which, is likely to be above \$400/tonne. One wonders whether there is any coordination between what the PM speaks, and what his government is doing? It seems a typical case of the left hand not knowing what the right hand is doing.

My humble submission is that the fertiliser subsidy, which is budgeted at ₹80,000 crores for the 2019-20 budget, be given directly to farmers on a per hectare basis, and let them decide whether they want to opt for ZBNF, or chemical fertiliser based farming. The fertiliser prices, then, will be market-determined, ensuring their efficient usage, and stopping their diversion to non-agri uses as well as to neighbouring countries. It will be a win-win situation. Can the Modi government do it in the next 100 days?

Retail prices of urea in selected countries

October 2018 (\$/metric tonne)



Vikram and vikaas

We are marching in a fog. The distant future is known perfectly accurately; \$5 trillion economy by 2024, but that is because we set it

MEGHNAD DESAI

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Views are personal



I WAS IN Mumbai, the week of Chandrayaan-2. Mumbai is in doldrums. There is gloom, and doom and despair about Sensex and Nifty tanking. The Budget is blamed for the trouble, and the subsequent corrections are only grudgingly acknowledged. People are asking whether the India story is over. Is this a cycle or a trend?

In the Chandrayaan space mission, the path, from the Earth to the vicinity of the moon, can be, and was, known accurately. Only in the last stage did the random element become dominating. Vikram was released, but its short course, from the vehicle to the ground, was frustrated. Modi took the attitude that this was a slip, not a failure.

A puzzle remains. People have been signalling the faltering course of the economy since the new government was installed. The Budget was based on the idea that the economy was on the correct course despite some growth estimates tending downward. The most recent estimate, for the first quarter of the financial year, indicates further decline. The course of the vehicle to the moon is measured with extreme accuracy. Economic data are subject to large measurement errors. So, 5% is really somewhere between 4% and 6%. Those who fancy they are driving the economy have fuzzy, steamed-up front-view, but even their rear-view mirror is hazy. We don't know where we are going, nor where we have come from. We are marching in a fog. The distant future is known perfectly accurately; \$5 trillion economy by 2024, but that is because we set it.

There is a problem of too much, too frequent information, which distorts judgement. Thus, because stock prices are published not just daily, but minute by minute, people believe they convey some information about the economy. But, we know that stock market

prices take a random walk from day-to-day, i.e., there is no information content in their daily movements. It is only the weekly, or monthly, average which yields information.

There is a similar story about GDP growth rates. What we get, are quarterly growth rates annualised. Each quarter's growth rate leads to speculation about the trend of the economy. But, if you plot them, you see that there is a lot of intra-year volatility, which gets averaged out when you compute the annual growth rate. The growth rate of GDP was 7.2% for 2017-18, while for 2018-19, it was 6.8%; given the margins of error, this means no change. But, look at quarterly growth rates, and you see the loop of an umbrella. From 6% in the first quarter of FY18, up to 8.1% by the fourth quarter of FY18. From then on, downward to 5.8% by the fourth quarter of FY19. Now, 5% for the first quarter of FY20. Is this no *vikaas*, as Rahul Gandhi says?

Take a four quarter moving average to find the direction of the economy. We get, from Q4FY18 onwards, 6.9%, 7.7%, 7.7%, 7.1%, 6.35%. So, there is a cycle, from the first to the last average, of 6.9% to 6.35%. This is not no *vikaas*. The question to ask is: Where will the economy go next?

It is quite clear that consumer expenditure on durable goods has declined, as indicated by bank loans data. This, in turn, may be either due to difficulties in the bank and non-bank credit market, both of which have become non-functional compared to the past. Consumers may also be saving more. It may also be that the job mar-

ket is changing, and many more are in the gig economy. They are self-employed, rather than employed. Banks may not regard them as safe prospects to give loan to, whatever their incomes. Banks need to modernise.

The government has made several payments to farmers, and many other claimants, but, obviously, its budgetary constraint is tight. The finance ministry has announced a new working group on infrastructure projects, with a budget of ₹100 trillion (\$1.4 trillion). Is this enough?

India is waiting for the prime minister to say where he thinks the economy is heading. No one else inspires the same confidence in the people, on any issue of national importance, as he does. On the same day as the loss of Vikram, the PM launched three new metro lines in Mumbai, reminding people of how much infrastructure has already been improved. But, while this is welcome, it was the end of an investment. What about the future?

The Budget did announce the intention of the government to borrow abroad. Bond yields are low, if not negative, across the developed countries' markets. It is a great opportunity for India to launch a 100-year bond, maturing in 2119, of up to \$2 trillion. India remains attractive internationally. Whatever the debt-to-GDP ratio, the ratio of the debt-servicing cost to GDP will remain manageable. India could reduce the hedging cost for the investor by guaranteeing the return in terms of gold equivalent, a sort of indexing. That will invite a flood of money from sovereign wealth funds and pension funds. India should not hesitate.

LETTERS TO THE EDITOR

PoK must be wrested

General Bipin Rawat has expressed the army's eagerness to rush across the Line of Control to take Pakistan-occupied Kashmir. Union defence minister Rajnath Singh has endorsed Rawat's views. Rajnath Singh has made it clear to Pakistan that India is willing for dialogue, provided support to terrorism is stopped, and the backbone of terrorism is broken. He has gone a step further, saying that dialogue, with respect to Kashmir, is only about PoK. The Modi government has shown exemplary courage in the abrogation of Article 370, which enjoined special status to Jammu and Kashmir, and also Article 35A that conferred rights to Kashmiris to purchase property in any part of India while denying the same right to people from other parts of India to purchase property in J&K. Time is ripe for Pakistan to realise that it has taken away a portion of Kashmir illegally. Kashmir is not complete until the illegally-held part of Kashmir is joined with its Indian part.
— KV Seetharamaiah, Hassan

ED action

The marathon grilling of arrested Congress MLA and former minister DK Shivakumar and his daughter, Ms Aishwarya, suggests that the Enforcement Directorate (ED) is leaving nothing to chance. Shivakumar was arrested by the ED on September 3 in a money laundering case, and the IT department had also seized unaccounted money, worth around ₹8.59 crore, from him. The ED has also reportedly untravelling questionable transactions in Aishwarya's name. With the ED bent on further quizzing the father-daughter duo, and the other accused in the hawala transactions already identified, the odds are stacked against the accused.
— NJ Ravi Chander, Bengaluru

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ILLUSTRATION: SHYAM KUMAR PRASAD

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GST rate cut for growth is a myth

The bigger challenge today is the slump in demand, and not high GST rates. GST is a just a component of the entire consideration that is paid by the end-consumer

AS IS KNOWN BY NOW, the goods and services tax (GST) is a destination-based consumption tax that is levied throughout the value chain, and the incidence of which is borne ultimately by the end-consumer—who cannot claim any input tax credit of the GST

paid on the final consumption. Hence, the lower the GST rate, the lower the incidence of the tax, and the lower the price paid by the final consumer for a particular commodity or service.

Of late, there has been an increasing clamour to reduce GST rates on various products—such as automobiles and

cement, among others—to give a boost to the economy and getting back to the higher GDP growth track. While the GST rate cut certainly reduces the final price in the hands of the end-consumer and does increase the probability of higher sales, it does not guarantee the same—in other words, a lower GST rate does not necessarily result in larger sales.

The bigger challenge today is the slump in demand, and not high GST rates. GST is a just a component of the entire consideration that is paid by the end-consumer. Let me give an example to illustrate the point. Let's assume that the price of a particular product is ₹100, and the current GST rate that is ₹10, and the current GST rate that is 28%. Reducing the GST rate to 18% will bring down the price by approximately ₹10, but what about the ability of the buyer to pay the balance ₹82? Unless the government addresses this issue, reducing the GST rate alone won't serve the desired purpose.

In addition, with the GST collection targets difficult to be met this fiscal, any further reduction in GST rates would push the economy towards a larger fiscal deficit, which the government has been successful in containing to a large extent.

Post the implementation of GST in July 2017, the government has proactively reduced GST rates on umpteen numbers of goods and services, which eventually have reduced the prices of these goods and services for the end-consumer. In addition, the government has announced exemptions for certain goods and services, which has also reduced the prices, but marginally, as the tax paid on inputs, input services and capital goods used in the manufacturing of such exempted goods or provision of such exempted services becomes a cost, which ultimately has to be borne by the end-consumer. Rather than totally exempting any goods or services from the GST, it is prudent to either categorise them in the lower bracket or "zero rate" them. Zero rating of a commodity or a service results in the same mathematical conclusion as

Rather than totally exempting any goods or services from the GST, it is prudent to either categorise them in the lower bracket or 'zero rate' them

exempting it, as "zero" tax is payable upon supply such a commodity or service in both the cases. However, the biggest plus point of zero rating over exempting is that the constituents in the value chain—such as manufacturers and traders—can claim full input tax credits, resulting into lowering of price for the final consumer. The tax-cascading effect is completely nullified, making the product less costly.

The exemption granted to products works counterproductive for the Make in India initiative of the government, as businesses tend to import and sell rather than manufacture and sell. This, definitely, can't be the desired outcome. Time is opportune for the government to look at the zero-rating option for certain products and services for domestic consumption. We already have zero rating for export supplies, which can be extended to a select category of goods and services.

For the economy to come back to the higher growth trajectory again, consumption of goods and services in India has to increase. The solution, perhaps, lies somewhere else—away from GST rates.

One, the quantum of export of goods has to grow substantially so as to generate revenue for Indian companies and increasing the employment rate, thereby increasing spending by Indians.

Two, the Make in India initiative has to gather speed, and new investments, both domestic and foreign, need to be increased by further easing the norms for doing business in India.

Three, India needs to take quick steps to take full advantage of the ongoing trade war between China and the US, by grabbing opportunities to supply goods to both the countries as they are huge markets to be served.

Four, the tax and regulatory environment in the country has to be certain for businesses operating in an honest and diligent manner. Easy compliance mechanism and hassle-free working of the government's IT mechanism can make all the difference.

Five, the liquidity crisis haunting Indian businesses has to be addressed more aggressively than ever before. Reducing interest rates on lending is the right step in this direction, and banks need to quickly percolate that down to end-consumers.

The agility and responsiveness shown by the government to tackle the economic slowdown is commendable, and it will take a certain period of time to see the positive results. In the interim, businesses should continue to focus on what they do the best—i.e. providing quality goods and services to consumers. The effects of earth-shattering reforms such as demonetisation and the implementation of the GST, to name a few, would last for a longer period of time and, hopefully, the end-result would prove to be good for the economy in the longer run. Patience and perseverance are the two main attitudes to stay afloat in these hard times, which shall also pass.

● APPRENTICES

The journey from 5 lakh to 50 lakh

**SUMIT
KUMAR**

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Not just labour reforms, ease of doing apprenticeship is critical to improve the employment landscape

THE GOVERNMENT HAS passed the Bill to merge 13 central labour laws into a single code. While the government has been working on improving 'compliance' and 'infrastructure', but on the 'employability' front it's still work in progress.

The government is making efforts to consolidate 44 labour laws into five labour codes around wages, social security, industrial safety and welfare, and industrial relations. GST was a big reform in the taxation system to simplify and facilitate business. Apprenticeship ecosystem, too, needs to be simplified; it needs to connect the dots to scale apprentices in the country. 'People', an important part of development, is still work in progress. There is a skill deficit of 12.5 crore people—only 40% employers are able to fulfil their talent needs. Yet only 4% of labour force has been developed through structured training; apprentices account for 0.1% in Indian labour force. These figures reflect lack of participation of employers, academia and youth. Apprenticeship is the best way to skill people as it entails work-based learning.

Only about 50,000 employers engage with apprenticeships, against 7.1 crore enterprises in India. In its previous tenure, the government aimed to reach 50 lakh apprentices in 5 years, for which it amended the Apprentices Act and made it conducive for employers to engage apprentices. But the mark didn't cross 5 lakh. There are three reasons for this: lack of awareness and understanding of the regulatory system, confusion amongst employers with respect to jurisdiction of multiple schemes, and the disconnect between training and higher education. While the Apprentices Act, 1961, gets executed by the MSDE and by MHRD, there are also departments like the Board of Apprenticeship Training and the Regional Directorate of Apprenticeship Training that look into apprenticeship. Further, every state has a skill mission that mostly resides with the ministry of labour. Also, there are schemes like the National Employability Enhancement Scheme (NEEM) that are recognised by the government but are not part of the Apprentices Act. All of this leaves employers with a lack of clarity. Apart from a conducive regulatory framework, improving the apprenticeship landscape needs simplification of system and an integrated approach.

Consolidation of employability schemes under the Act: There are about 3 lakh trainees who are receiving training through various work-based learning programmes. While they conform to the purpose of apprenticeship, they are not recognised under the Act. If all these programmes get acknowledged under the Act, it will eliminate confusion amongst employers and can drive better adoption.

PPP for achieving scale with governance: The NEEM, under MHRD, is an excellent example that has a third-party involved in execution and management, especially governance. That's the reason it has scaled up to 3 lakh trainees in a span of 5 years. Although third-party aggregator (TPA) rules have been laid out under the Act, they restrict the role of the private partner to a training partner instead of end-to-end execution of apprenticeship programmes. Empowering the TPA and granting authority for end-to-end execution of apprenticeship—from registration process to designing curriculum along with employer, execution of training, monitoring the progress and certification through a private training partner—will be convenient for employers. The government can ensure governance by defining clear-cut guidelines and making TPA accountable.

Integrating apprenticeships with higher education: Degree apprenticeships are gaining popularity in Europe as these offer qualification and build capabilities. Apprenticeships in India need close engagement between academia and employers. The Department of Higher Education should link degree with apprenticeships. As digital learning is gaining momentum, classroom learning under apprenticeship should be allowed through online/digital platforms. This will make apprenticeships the preferred choice of the youth.

Developed economies have a 3-4% participation of apprentices in the labour market. We need a lot of ground to achieve that scale. While India has a well-regulated apprenticeship system, the new government needs to add these catalysts to scale apprenticeships.

Blue planet: Another tick in the box for habitability

K2-18b is the first planet beyond the solar system confirmed to have water

SINCE ITS DISCOVERY in 2015, the exoplanet K2-18b has elicited much excitement. Swirling around a red-dwarf star about 110 light-years away from Earth, the distant world sits in a so-called Goldilocks zone—not close enough to its host star to be too hot and not far enough away to be too cold—that could allow liquid water to flow across its surface. That is a crucial condition for life.

Now astronomers have cranked up the speculation. Follow-up images taken by the Hubble Space Telescope suggest K2-18b has an atmosphere containing large amounts of water vapour—the first exoplanet in a habitable zone to have this confirmed. Most exoplanets previously found with atmospheres have been gas giants, similar to Neptune or Jupiter. K2-18b instead looks like it could be a rocky planet twice as big as Earth, perhaps covered in vast ice-covered seas.

To make the discovery of atmospheric water, Angelos Tsaras, an astronomer at University College London, and his colleagues looked at how light filtered

through the atmosphere of K2-18b as it passed in front of its star between 2015 and 2017. This spectroscopic technique is a way to analyse the atmospheric composition of exoplanets, based on which wavelengths of light make it through and which are blocked. But it is difficult—especially for the relatively small and cold rocky worlds that could hold the conditions for life

In *Nature Astronomy*, Dr Tsaras describes how his team wrote software that could analyse the data collected by Hubble to try to do the same job—to a point. They were not able to pinpoint the exact form and amounts of the water they found. Instead they used computer mod-

els to simulate the most likely scenarios, and concluded that as much as half of the atmosphere of K2-18b could be water vapour. They also found evidence of large amounts of hydrogen and helium gas.

This is just the start of such study of planets beyond our solar system. Astronomers plan to launch two new orbiting telescopes in the next decade—the US's James Webb Space Telescope and the European ARIEL survey—that will be powerful enough to peer into the atmospheres of exoplanets more closely. Powerful enough, perhaps, to detect telltale molecular signatures of life.

THE ECONOMIST

THE TRIPLE HELIX model of innovation refers to constant interactions between academia, industry and governments to foster economic and social development. The model emphasises on boosting innovation for development. It describes the role of a university to join hands with industry and government. It explains social formats for production, transfer and application of knowledge. Triple helix covers creative destruction—a concept coined by Joseph Schumpeter in 1942—i.e. new innovations killing older ones. Innovation arises within each of the three spheres—university, industry and government. Creative destruction cannot be avoided when we embrace innovation. In an economic sense, creativity can produce some destructive consequences.

Triple helix was developed in the 1990s by Henry Etzkowitz and Loet Leydesdorff. The best example of triple helix is the Silicon Valley. The government provided land, flexible financing, stretched tax holidays and fitting guidelines to the IT cluster in California. Small and big IT businesses thrived in this cluster. The world has seen success stories of Dell, HP, Oracle, Intel, Microsoft, etc. The very needs of the industry, powered by the created market, generate the need for the academia, which, in this case, comprises of ICT professionals who are given all facilities to do R&D and new product development. Government, industry and academia all profit as taxes are collected on sales of goods, revenue is generated and knowledge is developed inside a suitable research environment. The Silicon Valley has given rise to con-

Triple helix model of innovation

The government must help develop a scientific research culture in Indian universities

**VIDYA
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sumerism. Multiple producers of IT goods and services shield consumers from hopeless, inferior products, and ambiguous advertisements. Also, unfair pricing does not work because of intense competition. The ever-expanding consumption of IT goods and services is beneficial to the economy. The third benefit is increased consumption of computers and application software has made the world electronic savvy, and this has reduced the dependence on paper.

Many research scholars registered for PhD in universities can do wonders if only government and industry take interest in them. Government and industry can seed early-stage researches that are useful for business and societies. Progressive organisations increasingly seed it in areas of

interest to them. They work closely with the progress of the PhD by funding or co-funding. Difficult scientific problems or new areas of technology are of interest to companies. Their scientists or engineers co-mentor researchers and their guides. If something promising emerges, companies pour more funds either directly or via a collaborative proposal through a government agency. For example, the Harvard Medical School is partnered with Schlumberger, Philips Healthcare and US National Institutes of Health. At Harvard, many medical and pharma companies submit joint proposals to government agencies for the long-term aim of deciphering the results into innovative products.

The triple helix model is based on developing institutions, not just individuals.



Innovation is the key in any research. For instance, when representatives from Philips Healthcare moved to Boston, they got to know several members of Boston University School of Engineering's faculty. Soon, a project with multi-year funding was developed to focus on a question of fundamental science in personalised medicine. A licensing agreement was negotiated in advance, stipulating that any emergent IP must be converted into a product within a specified period of time or it would slip back to sole ownership of the university.

Red Hat, founded in 1993, is an American MNC software company, now owned by IBM, providing open-source software to the enterprise community. The company has created a formal \$5 million partnership with Boston University to advance

research and education on open source and emerging technologies, including cloud computing, machine learning, automation and big data. The fund runs the scope from co-supervising PhD and post-doctoral students to fund collaborative projects with faculty under the umbrella of what is called the Open Cloud Computing Initiative. Boston University and Red Hat will jointly license co-developed technology while each party retains exclusive rights to its pre-existing IP. Also, IP developed solely by Boston University or Red Hat is owned by whichever organisation employs the inventor.

University-industry interactions: Etzkowitz and Leydesdorff emphasised that the initial role of a university is to provide education to individuals and basic

research. It's like the Linear Model of Innovation; universities are supposed to provide research, on which industry builds commercial goods. Other interactions take place through the involvement of industry managers and university faculty in both sectors. According to Etzkowitz and Leydesdorff, the transfer of people between university and industry is a mode of transfer of knowledge. A university flourishes because of research, and industry grows on research in universities.

University-government interactions: The power of interactions between government and universities depends on policies on higher education. Government has a higher influence on universities because they are the main source of funding. Government depends on universities to push innovations for the purpose of defence, economics, medical science, etc.

Do you know that the US Department of Defense extensively funded physics research during World War 2 and the Cold War? Another example is the Morrill Land-Grant Acts (1862) that allowed the creation of land-grant colleges. It was enacted during the American Civil War. During this period, universities such as Cornell University, University of Florida and Purdue University were created under land-grant.

We need universities with a core mission of producing educated people who are needed to build and run a flourishing economy. Today, in India, how many universities have been able to connect their activities to society and the nation's economy? We hope the current government takes keen interest in developing scientific research culture in Indian universities.