

Rock, paper or scissors: The trilemma of fertiliser policy in India

Introduction

It was a warm afternoon and Kim Liên was absorbed in the week's *Economist* magazine when her phone rang. A voice on the other side of the phone told her that the newly elected Indian prime minister would like to meet her as soon as possible. Liên, who was accustomed to taking calls from high-ranking officials, arranged for the meeting to take place the next day.

Liên had retired as the vice president for the Development Impact Evaluation (DIME) group at the World Bank some years ago. During her career, she had established a reputation as an independent and pragmatic thinker who successfully met project targets without compromising on partner governments' concerns. Three decades of work under the bank's theme areas of agriculture, energy, environment and rural development had given Liên an in-depth knowledge and understanding of these issues. Having spent a considerable amount of time headquartered at the World Bank's Asia office, she was regarded as an expert on these issues, especially in Asia. In the years after her retirement, governments in the region frequently called upon Liên for her reliable and non-partisan advice on policy matters.

As she put down *The Economist*, Liên wondered what the meeting could be about. She had an inkling that it could be related to agriculture, given the prime minister's campaign promise of doubling farmers' incomes in the next five years. She soon found that her guess wasn't too far off the mark.

When they met the next day, the prime minister got straight to the point. He needed Liên's help on an issue close to his heart: India's fertiliser policy. Since 1957, the fertiliser subsidy had existed in some form or the other in India,¹ with the aim of providing support to the agriculture sector. However, over time budgetary allocations to fertilisers had continued to increase steadily, so much so that fertiliser subsidies were presently the second highest subsidy funded by the government. While the overuse of fertilisers presented serious environmental concerns, there was also evidence that farmers were unable to fulfil their fertiliser needs in a timely fashion.² The present system, which was neither efficient nor particularly effective at fulfilling its objectives, needed to change. It was against this

¹CAG, "Chapter 2: Fertiliser Subsidy Regime." In *Performance Audit of Fertilizer Subsidy in India of Union Government, Ministry of Chemicals and Fertilizers*. Report No. 8. Comptroller and Auditor General of India, Government of India, August 5, 2011, <http://cag.gov.in/content/report-no-8-2011---performance-audit-fertilizer-subsidy-india-union-government-ministry> (December 30, 2017).

²CAG, "Chapter 8: Summary of Results of Dealer and Farmer Survey." In *Performance Audit of Fertilizer Subsidy in India of Union Government, Ministry of Chemicals and Fertilizers*. Report No. 8. Comptroller and Auditor General of India, Government of India, August 5, 2011, <http://cag.gov.in/content/report-no-8-2011---performance-audit-fertilizer-subsidy-india-union-government-ministry> (November 20, 2017).

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backdrop that the prime minister asked Liên, “What should we do to make the existing fertiliser policy fiscally and environmentally sustainable, as well as politically feasible?”

The prime minister nodded to three people seated across the room and introduced them to Liên. They were the agriculture minister, the finance minister and the environment minister. Each of them would present to Liên their ministry’s perspective on the issue over the next few days.

Livelihoods and food security: The agriculture minister’s angle

The minister for agriculture began by laying out the background and rationale for India’s fertiliser subsidy policy.

“The twentieth century saw India witness some of the worst famines in contemporary times that led to the loss of millions of lives. Food security was thus one of the major policy goals for the government in post-independence India. However, until the 1960s India was heavily dependent on food aid and food-grain imports. This only changed with the ‘Green Revolution’ of the mid-1960s, when the use of fertilisers, high yielding varieties of seeds and irrigation contributed to increased food grain production.³ Between the early 1950s and 2015-2016, food grain production increased from 51 to 272 million tonnes, solving the need to import food from other countries⁴ and increasing the per capita food grain availability from 144 kg per year in 1951 to 170 kg per year in 2015.” The agriculture minister pointed to a figure in the dossier illustrating these increases (Figure 1).

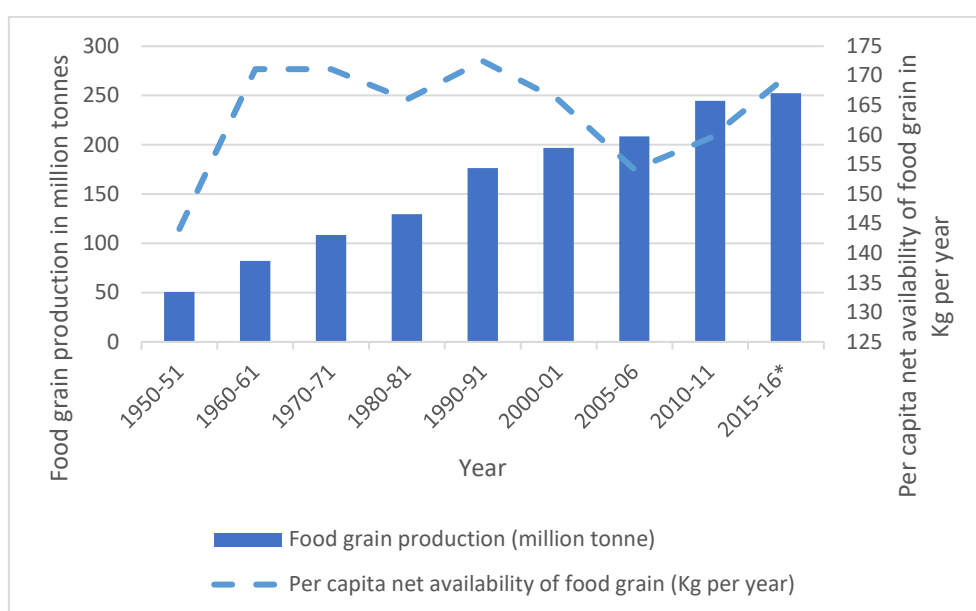


Figure 1 - Between the 1950s and 2015-2016, food grain production and the per capita net availability of food grains increased in India. 2015-16 data is based on preliminary estimates. Source: Directorate of Economics & Statistics. 2017. “Agricultural Statistics at a Glance 2016.” Department of Agriculture, Cooperation & Farmers Welfare. Ministry of Agriculture & Farmers Welfare, Government of India. <http://eands.dacnet.nic.in/PDF/Glance-2016.pdf>.

³ Ashok Gulati and Pritha Banerjee, “Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options” *Working Paper 307* (Indian Council for Research in International Economic Relations, August 2015).

⁴ Tanvi Deshpande. *State of Agriculture in India*. PRS, 2017.

As Liên studied the figure, the minister continued. “According to several estimates, between 50 and 60 percent of the increase in food grain production in this period came from higher fertiliser use.⁵ Because Indian soils were typically deficient in nitrogen (N), phosphatic (P) and potassic (K) nutrients,⁶ fertilisers were important to ensure that the soil remained fertile and healthy for sustained grain production.”

“Hence the subsidy policy for fertilisers,” Liên said.

“That’s correct. In order to support agriculture, the government of India has been providing subsidies or concessions to the fertiliser sector to ensure that nitrogen, phosphatic and potassic based fertilisers are available to farmers at affordable prices,” said the minister.

“Can you tell me more about these subsidies?” Liên asked.

“Numerous committees have been constituted and changes have been made to the subsidy delivery mechanism since the introduction of the policy,” the agriculture minister replied. “The most recent of these was the New Urea Policy of 2015.⁷ As the system currently stands, urea—the main nitrogenous fertiliser—is ‘controlled’; that is, it is sold at a statutory notified uniform sale price and subject to price, movement and distribution control. In contrast, the phosphatic and potassic fertilisers are decontrolled and sold at maximum retail prices (MRPs). These MRPs are determined by fertiliser companies at ‘reasonable rates’ following a market-driven demand-supply calculus, after incorporating a subsidy element that remains fixed.⁸ However, as you know, this policy has been facing problems. Because domestic production of fertilisers hasn’t increased in a commensurate fashion, the enlarging fertiliser consumption is met through imports, whose pricing follows international prices and is hence volatile.”

Liên nodded, aware that in order for any public policy to meet its objectives, it was important for stakeholders’ incentives to be aligned with policy goals. While the rationale behind the policy pertaining to the nitrogenous fertiliser had been to boost its indigenous production, the subsidy regime had failed to incentivize domestic production. Meanwhile, the decontrolled pricing policy for phosphatic and potassic fertilisers had led to sharp increases in their prices.⁹

“I see,” Liên said. “This must affect the farming community.”

⁵ P Venugopal, “Input Management.” In *State of the Indian Farmer: A Millennium Study*, 59–60. 8. New Delhi: Academic Foundation for the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, 2004.

⁶ FAO, *Fertilizer Use by Crop in India*. Land and Plant Nutrition Management Service, Land and Water Development Division. Rome: Food and Agriculture Organization of the United Nations, 2005. <http://www.fao.org/3/a-a0257e.pdf> (February 2, 2018).

⁷ Press Information Bureau, “Approval to Comprehensive New Urea Policy 2015.” Cabinet, Government of India, May 13, 2015. <http://pib.nic.in/newsite/PrintRelease.aspx?relid=121666> (February 1, 2018).

⁸ Gulati and Banerjee, “Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options”.

⁹ Ministry of Finance, “Chapter 8: Agriculture and Food Management.” In *The Economic Survey of India 2013-14*, p 144, 2014. <http://www.indiabudget.gov.in/budget2014-2015/es2013-14/echap-08.pdf> (January 3, 2018).

The agriculture minister nodded. “Unfortunately, the fertiliser subsidy doesn’t seem to be benefitting all farmers. A survey found that 59 percent of farmers from a sample of 5,492 faced difficulties in obtaining their full requirement of fertilisers in a timely fashion. This was consistent with the dealers’ survey results, wherein only about half the dealers said they were able to supply fertilisers to farmers on time. And it is not a problem of quantity alone. Because of inadequacies in fertiliser quality testing infrastructure in the country, farmers are often sold sub-standard fertilisers.”¹⁰

The meeting with the agriculture minister made Liên realise that fertilisers had played an integral role in boosting agricultural production and making India food grain secure. However, she questioned whether the government needed to realign its policy priorities, given that ensuring adequate food production was no longer the pressing issue for India that it used to be. Moreover, the current fertiliser policy hadn’t been successful in developing indigenous fertiliser production, nor did it seem to be fulfilling farmers’ needs for fertilisers. When she met the finance minister next, she realised that in addition to these concerns, the fiscal implications of a fertiliser subsidy policy also needed to be considered.

Public finance and subsidy delivery: The finance minister’s perspective

The finance minister began by focusing on the manner of administration of the fertiliser subsidy.

“The procedure for the payment of the fertiliser subsidy is that every month once the fertiliser is dispatched at the district level, manufacturers submit detailed claims regarding the amount of fertiliser sent out,” the finance minister said. “Following the verification of claims, payment is supposed to be released by the government based on the notified rates. However, there is no mechanism for reconciliation of unit-wise and district-wise dispatch data with corresponding data at the first point of receipt. Large scale discrepancies have been observed between quantities that are received by the various states and the amount that manufacturers dispatch. This suggests two possibilities: that pilferage of fertilisers takes place in transit itself or that manufacturers are over-stating their claims. Moreover, in most states of India, there is no process for verifying that fertiliser sale is for agricultural purposes alone.”¹¹

“I would suppose that the statutorily notified low price of urea may also be distorting farmers’ incentives to be judicious in its application, and that may be resulting in its overuse and rising consumption,” Liên said.

The finance minister agreed. “Of the total fertiliser subsidy that is paid out, almost 70% of it is captured by subsidies on urea. The end result is that for the fertiliser sector as a whole,

¹⁰CAG, “Executive Summary.” In *Performance Audit of Fertilizer Subsidy in India of Union Government, Ministry of Chemicals and Fertilizers*. Report No. 8. Comptroller and Auditor General of India, Government of India, 2011. <http://cag.gov.in/content/report-no-8-2011—performance-audit-fertilizer-subsidy-india-union-government-ministry> (December 28, 2017).

¹¹CAG. “Chapter 6: Payment of Subsidy Claims.” In *Performance Audit of Fertilizer Subsidy in India of Union Government, Ministry of Chemicals and Fertilizers*. Report No. 8. Comptroller and Auditor General of India, Government of India, 2011. <http://cag.gov.in/content/report-no-8-2011—performance-audit-fertilizer-subsidy-india-union-government-ministry> (December 28, 2017).

consumption has gone up substantially. Between 2002 to 2014, fertiliser consumption per hectare of arable land increased from 100.329 kg to 165.125 kg.”¹²

Liên knew India was among the top consumers of nitrogenous, phosphatic and potassic fertilisers in the world, with rising fertiliser consumption being financed by greater government expenditure on the fertiliser subsidy.

“What are the fiscal implications of the fertiliser subsidy policy?” she queried.

“Currently it is the second highest subsidy that is paid out by the government. The fertiliser subsidy amounted to 10.9 billion USD in 2016 to 2017, which was equivalent to 0.46% of the GDP,”¹³ the finance minister replied, pointing to a slide on his presentation (Figure 2).

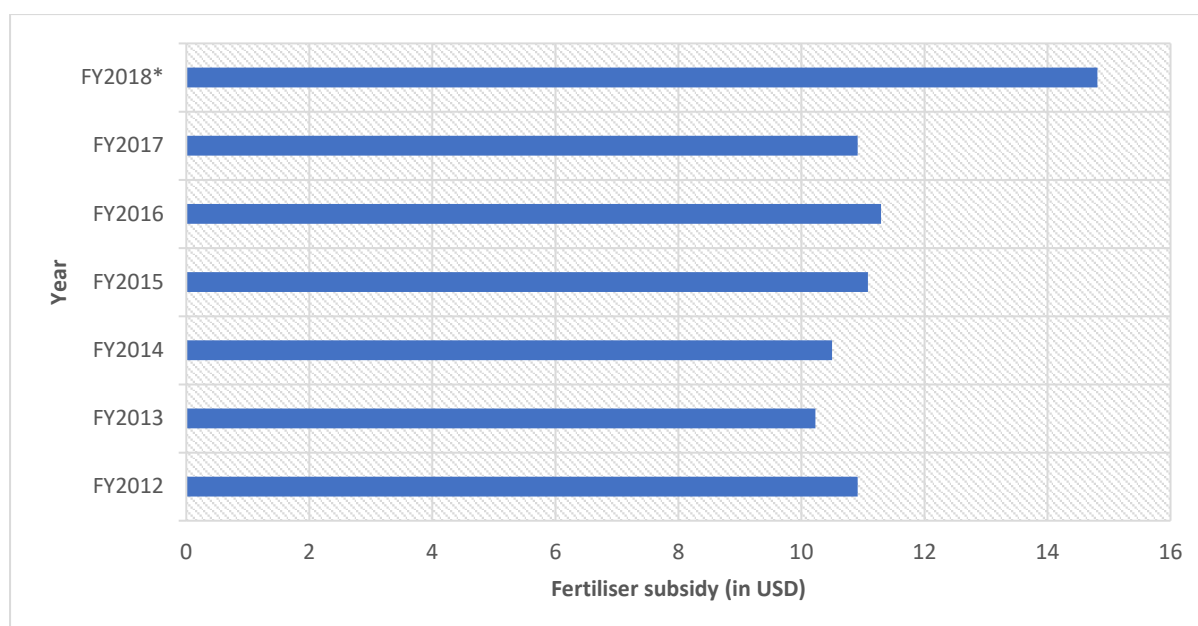


Figure 2 - Taking into account prior dues to fertiliser manufacturers, the total amount of the fertiliser subsidy is close to 1% of GDP. This is equivalent to the government’s total spending on social sectors. Note that data for FY2018 is estimated based on a subsidy requirement of 10.9 billion USD and prior dues of 5.4 billion USD. Conversion rate applied: 1 USD~64.1 INR. Source: Ministry of Finance. 2016. “Expenditure Budget 2016-17.” Volume I. Government of India. <http://www.indiabudget.gov.in/budget2016-2017/ub2016-17/eb/stat02.pdf>.

“This large fiscal burden imposed by the fertiliser subsidy is exacerbated by the pending dues that the government owes the fertiliser companies,” the minister added. “For the fiscal year 2016, this amount was estimated to be around 5.4 billion USD.”¹⁴

¹²World Bank. “World Bank Data.” *World Bank Open Data*. Accessed January 29, 2018. <https://data.worldbank.org/indicator/AG.CON.FERT.PT.ZS?locations=IN>.

¹³Ministry of Finance. “Expenditure Budget 2016-17.” Volume I. Government of India, 2016. <http://www.indiabudget.gov.in/budget2016-2017/ub2016-17/eb/stat02.pdf> (December 24, 2017).

¹⁴R. Sree Ram, “Budget 2017: The Farm Sector Impact.” *Live Mint*, February 2, 2017. <http://www.livemint.com/Money/xVIK8zQLZut6MIGMjZ9qwl/Budget-2017-The-farm-sector-impact.html> (January 3, 2018).

“Why does this happen?” Liên asked.

“According to the Fertiliser Association of India (FAI), the government is to blame because it grossly under-budgets for the fertiliser subsidy, and thus budgetary allocations get exhausted within the first five months of the fiscal year.¹⁵ Delayed or non-payments of the subsidy have contributed to close to half of all urea units running on losses between 2013 and 2016,”¹⁶ the minister said.

Liên’s meeting with the finance minister helped add to her expanding dossier on the fertiliser subsidy. Highlighted in her dossier was a sobering figure: despite the high amount of the fertiliser subsidy, only 35% of it actually reached small farmers.¹⁷ And even this limited outreach was enough to cause serious harm to the environment, as Liên found out in her meeting with the environment minister.

Productivity and sustainability: The environment minister’s stance

The environment minister focused on the outcomes of the fertiliser subsidy policy.

“Since the amount of cultivable land is limited, maintaining soil fertility is important not just for the sake of the environment but also to keep agricultural productivity intact and ensure grain production on a sustainable basis,” the environment minister said. “But if soil fertility is to be preserved, then it is crucial that fertilisers be applied in a timely fashion and in the correct proportion. The ideal ratio for the use of nitrogenous (N), phosphatic (P) and potassic fertilisers (K) is 4: 2: 1. However, because of the fertiliser subsidy policy, prices for urea, which is a nitrogenous fertiliser, are very low. This gives wrong signals to cultivators and leads to over-use of urea. Consequently, the ratio of N, P and K usage has become very imbalanced: it was 9.9: 3.3: 1 in 2012 to 2013, and in some agricultural states this ratio was distorted even further”. The environment minister displayed a table with the N, P, K usage ratio in India on the screen (Table 1).

¹⁵Sayantana Bera, “Dues to Fertiliser Manufacturers Likely at Rs45,000 Crore by End of Fiscal: FAI.” *Live Mint*, November 30, 2015. <http://www.livemint.com/Politics/4k3jWaMT6e8mTXBuRDy18H/Dues-to-fertiliser-manufacturers-likely-at-Rs45000-crore-by.html> (January 7, 2018).

¹⁶FAI. “Annual Report 2016-17.” New Delhi: The Fertiliser Association of India, 2017. http://www.faidelhi.org/general/Annual_Report_2016-17.pdf. (January 15, 2018).

¹⁷Ministry of Finance, “Chapter 9: Reforming the Fertiliser Sector.” In *The Economic Survey of India 2015-16*, I. Government of India, 2016. <http://www.indiabudget.gov.in/budget2014-2015/es2013-14/echap-08.pdf> (February 3, 2018).

Year	All-India	Haryana	Punjab	Rajasthan
2000-01	7.0: 2.7: 1	73.9: 21.3: 1	42.5: 11.9: 1	92.1: 30.5: 1
2007-08	5.5: 2.1: 1	39.8: 10.9: 1	34.3: 9.0: 1	33.7: 12.5: 1
2008-09	4.6: 2.0: 1	32.2: 10.7: 1	23.6: 6.7: 1	30.2: 13.6: 1
2010-11	4.7: 2.3: 1	20.5: 7.1: 1	19.1: 5.9: 1	24.9: 11.8: 1
2011-12	6.7: 3.1: 1	27.2: 9.8: 1	26.8: 8.5: 1	34.9: 15.9: 1
2012-13	9.9: 3.3: 1	61.4: 18.7: 1	61.7: 19.2: 1	44.9: 16.5: 1

Table 1 - In India, fertiliser use has been far from the ideal N: P: K ratio of 4: 2: 1, with the ratio particularly distorted in some Indian states and worsening with time. Source: Gulati, Ashok, and Pritha Banerjee. 2015. "Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options." Working Paper 307. Indian Council for Research in International Economic Relations.

"You may be aware of the consequences of such imbalanced fertiliser use," the minister said. "Studies have found that compounds released with the application of nitrogenous fertilisers contribute to soil acidity, depletion of the stratospheric ozone layer and contamination of groundwater.¹⁸ And the excessive use of fertilisers has resulted in the decreasing response of crops to their usage,¹⁹ in addition to directly harming the environment. In fact, a government performance audit report found the correlation between increased fertiliser production and increased agricultural production between the years 2003 and 2009 to be relatively weak."²⁰

"Urea overuse is also tied to decreased soil and plant health and a loss of beneficial soil microbes. This has resulted in the emergence of new variants of pest and diseases in several crops, harming farmers as this leads to increased expenditure on plant protection measures such as pesticides. The residue of these chemicals is present in plants even after several days of application.²¹ The fertiliser policy has also resulted in skewing agricultural production away from fruits, vegetables, or horticultural cropping as these require non-urea fertilisers that are not easily available at cheap rates. This has a concomitant impact on dietary diversity and nutrition of citizens."

Liên wondered whether biofertilisers, which are artificially multiplied cultures of certain soil organisms that can help boost soil fertility and productivity, could serve as an alternative to urea-based fertilisers in the Indian context. She asked the minister about this possibility.

The environment minister did not sound very optimistic in his response. "There is currently a lack of knowledge and awareness in the farming community about biofertilisers. And their

¹⁸Rajendra Prasad, "Efficient Fertilizer Use: The Key to Food Security and Better Environment." *Journal of Tropical Agriculture* 47, no. 1 (2009): 1–17.

¹⁹Department of Fertilisers, "Report of the Working Group on Fertiliser Subsidy for the Twelfth Plan (2012-13 to 2016-17)." Ministry of Chemicals and Fertilisers, Government of India. Accessed December 15, 2017. http://planningcommission.gov.in/aboutus/committee/wrkgrp12/wg_fert0203.pdf.

²⁰CAG. "Chapter 5: Fertiliser Production, Import and Consumption." In *Performance Audit of Fertilizer Subsidy in India of Union Government, Ministry of Chemicals and Fertilizers*. Report No. 8. Comptroller and Auditor General of India, Government of India, 2011.

http://www.cag.gov.in/sites/default/files/audit_report_files/Union_Performance_Civil_Fertilizer_Subsidy_Ministry_of_Chemicals_and_Fertilizers_8_2011_Chapter_5.pdf (December 28, 2017).

²¹Senthil Kumar, "Overuse of Urea," Email communication, December 24, 2017.

production faces spatial diffusion and limited privatization, which suggests there is a long way to go until they can serve as a viable alternative.”²²

Liên’s options

Liên faced a difficult task. The newly elected prime minister had run a campaign based on promises of better livelihoods for farmers and the agriculture-dependent population, who together constituted over two thirds of the electorate. Despite numerous attempts to reform the system, India had been struggling to manage the fiscal burden of the fertiliser subsidy. Liên could not ask the Indian government to do away with the fertiliser subsidy altogether and comply with WTO norms, but she also needed to strike a balance between financial constraints and environmental and livelihood concerns.

After her meetings with the three ministers, Liên felt that there were still some perspectives that were not being considered and so she conducted some research of her own. She found that the current method of estimation of subsidy requirements was based on projections of 5% to 10% increases over the previous season’s requirements, rather than a proper scientific assessment. This contributed to mismatches between demand, supply and government budgeting. Second, she also found that no official procedure was being followed to verify: i) manufacturers’ claims, and ii) whether the final sale was for agricultural purposes alone.²³ The manner of administering the subsidy and the delivery systems therefore had to be reformed.

Further, Liên felt that the government’s policy of subsidisation of select nutrients had not only contributed to their imbalanced use and the resulting harm to the environment, but had also diverted policy attention away from other secondary and micro nutrient deficiencies from which Indian soils suffered. For example, zinc deficiency in the soil led to agricultural produce that was low in zinc, which contributed to stunted growth and impaired development among children.²⁴ If the government wanted to improve nutritional outcomes among citizens, should it continue with a selective subsidisation of certain nutrients or include more nutrients under the ambit of the subsidy?

Liên also realised that farmers were often unaware of the dangers that accompanied the imbalanced use of chemical fertilisers. A survey of over 5,000 farmers found that 76% of them had not conducted a scientific assessment of the kind and quantity of fertiliser the soil required.²⁵ Moreover, while biofertilisers offered an alternative to chemical fertilisers, there was a gap in both their demand and supply. A lack of awareness as well as a reluctance to embrace alternatives resulted in demand being inadequate and inconsistent.²⁶ On the supply side, retail shops did not sell biofertilisers because of their limited shelf life and lack of storage facilities.²⁷ The biofertiliser industry had experienced limited growth in

²²Nilabja Ghosh, “Promoting Biofertilisers in Indian Agriculture.” *Economic and Political Weekly*, 2004, 5617–25.

²³CAG, “Executive Summary.” In *Performance Audit of Fertilizer Subsidy in India of Union Government*, Ministry of Chemicals and Fertilizers.

²⁴Gulati and Banerjee, “Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options.”

²⁵CAG, “Chapter 8: Summary of Results of Dealer and Farmer Survey.”

²⁶Nilabja Ghosh, “Promoting Biofertilisers in Indian Agriculture.”

²⁷Mohd Mazid, and Taqi Ahmed Khan. “Future of Bio-Fertilizers in Indian Agriculture: An Overview.”

distribution, despite the Indian government's attempts to promote it in the last decade.²⁸ What steps could help ensure a transition to environmentally friendly alternatives? Could the subsidy for chemical fertilisers be replaced by one for organic fertilisers instead?

Liên also noticed that compared to China, another big consumer of nitrogenous fertilisers, India had not been able to significantly increase indigenous production. Between 2000 and 2012, China had more than doubled domestic production to 49.6 million metric tonnes and had become a net exporter, whereas India's production of nitrogenous fertilisers increased from 10.9 million metric tonnes to just 12.2 million metric tonnes over the same period, resulting in India's continued dependence on imports.²⁹ Given that imported fertilisers tended to follow the trend in international petroleum prices,³⁰ import dependence would need to decrease and domestic production would need to increase if the subsidy bill were to be reduced. This made it important for Indian manufacturers to increase the capacity of domestic plants, as well as utilise the existing capacity better. How could efficiency in plant operations be promoted? Could market-determined prices incentivise fertiliser manufacturers to manage plant operations more efficiently?

A decontrol of fertiliser prices would have to be combined with a safety net for farmers. Countries such as the United States of America that provided some form of support to their agriculture sector had moved from price support to income support. China had also shifted from fertiliser subsidies to direct cash transfers to farmers on a per hectare basis.³¹ Liên wondered if India could take this route by shifting from price support for fertilisers to income support for farmers instead. A reform to the fertiliser subsidy policy, despite being politically contentious, could be undertaken if a viable alternative seemed possible. Indonesia, for instance, overcame social and political opposition to fuel subsidy reform through its use of an unconditional cash transfer programme.³²

Direct cash transfers coupled with decontrolled prices could ensure better targeting of support for farmers and help control the diversion of fertilisers for non-agricultural purposes. It would also incentivise a more balanced use of N, P and K fertilisers. But critics of direct cash transfers argued that they were often used by recipients on wasteful expenditures. Moreover, there was the issue of determining an appropriate amount for transferring, the best recipients for transfers, and how transfers would be conducted given the limitations of technology and financial access in rural areas. Doing away with the fertiliser subsidy also ran the risk of revealing the inefficiencies of domestic production and preventing domestic manufacturers from withstanding global competition. This would put the country at risk of being even more dependent on fertiliser imports and the volatile international market.

²⁸Nilabja Ghosh, "Promoting Biofertilisers in Indian Agriculture."

²⁹Gulati and Banerjee, "Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options."

³⁰Himanshu, "India's Flawed Fertilizer Policy." *Live Mint*, April 1, 2015.

<http://www.livemint.com/Opinion/XCCJwEzbxwiyWfYfK1wRdO/Indias-flawed-FERTILISER-policy.html> (January 3, 2018).

³¹ Gulati and Banerjee, "Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options."

³²Christopher Beaton, and Lucky Lontoh, *Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies*. International Institute for Sustainable Development (iisd), 2010.

https://iisd.org/pdf/2010/lessons_indonesia_fossil_fuel_reform.pdf (January 30, 2018).

As she mulled over these issues, Liên realised there were several fundamental issues that needed to be addressed. First, the choice had to be made between a subsidy-based policy tool and direct income support to farmers. Second, the government had to determine a way to ensure balanced micro and macronutrient levels in the soil while promoting environmentally sustainable agricultural practices. Third, the government had to put in place a mechanism for administering the policy tool to control for leakages in the delivery system. Finally, the government had to establish a fertiliser policy that could complement other governmental programmes to contribute towards an agricultural sector that was self-sufficient and sustainable.

Epilogue

In October 2017, the Indian government initiated a rollout of a direct benefit transfer (DBT) scheme for delivering the fertiliser subsidy.³³ The subsidy continues to be paid to the fertiliser companies in the form of the price difference between the actual value of the fertiliser and the price at which it is sold. But the sale of fertiliser takes place only once the farmer's unique identity number (*Aadhar*)³⁴ is recorded electronically through a point of sale machine. The nutrient mix in the fertiliser that is provided to the farmer is based on the soil status of the farmer's land as reported in the soil health card.³⁵

³³PTI, "Govt Rolls out Direct Benefit Transfer for Fertiliser Subsidy in Seven States/UTs." *First Post*, October 11, 2017, sec. Business.

³⁴Aadhaar is a 12-digit unique identity number issued to all Indian residents based on their biometric and demographic data.

³⁵Under the Soil Health Card Scheme the government issues soil cards to farmers that carry crop-wise recommendations of nutrients and fertilisers for their soil based on a test of the soil.