PCC Issues Paper
No. 02 Series of 2021

ISSUES PAPER

Issues Paper on the Philippine Fertilizer Industry

Roehlano M. Briones,
Philippine Institute for Development Studies

With contribution from Peter S. Turingan,
Senate Economic Planning Office

PHILIPPINE COMPETITION COMMISSION

Issues Paper on the Fertilizer Industry in the Philippines

Roehlano M. Briones, Philippine Institute for Development Studies

With contribution from Peter S. Turingan, Senate Economic Planning Office

Published by:

Philippine Competition Commission
25/F Vertis North Corporate Center 1
North Avenue, Quezon City 1105

CONTENTS

LIST OF TABLES AND FIGURES

LIST OF ABBREVIATIONS

AFC	Atlas Fertilizer Corporation
AMPLE	Agricultural Model for Policy Evaluation
APCM	Adjusted Price Cost Margin
ARMM	Autonomous Region in Muslim Mindanao
ASEAN	Association of Southeast Asian Nations
ASPBI	Annual Survey of Philippine Business and Industry
BLUE	Best Linear Unbiased
BOT	Bank of Thailand
CAR	Cordillera Autonomous Region
CDA	Cooperative Development Authority
CGE	Computable General Equilibrium
CPBI	Census of Philippine Business and Industry
CTC	Certified True Copy
DA	Department of Agriculture
DAP	Diammonium Phosphate
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
ECC	Environmental Clearance Certificate
FIAP	Fertilizer Industry Association of the Philippines
FOB	Free on Board
FPA	Fertilizer and Pesticide Authority
GVA	Gross Value Added
ITR	Income Tax Return
LGU	Local Government Unit
MFN	Most Favored Nation
NPK	Nitrogen, Phosphorus, Potassium
NPR	Nominal Protection Rate
OLS	Ordinary Least Squares
PCC	Philippine Competition Commission
Philphos	Philippine Phosphate Corporation
Php	Philippine Pesos
PSA	Philippine Statistics Authority
PSIC	Philippine Standard Industry Classification
RA	Republic Act

RPD	Retail Price Disparity
UHI	Universal Harvester, Inc.
USD	United States Dollars
VAT	Value Added Tax

INTRODUCTION

The Philippine Competition Commission (PCC) has commissioned this issues paper to examine the competitive landscape of the fertilizer industry. Selection of the fertilizer industry for this study is due to a finding from a previous Issues Paper on manufacturing: Medalla, et al. (2018) examined sub-sectors at 4-digit Philippine Standard Industry Classification (PSIC) as a screening exercise to determine priorities for further analysis of the state of competition in that sub-sector.

To assess the competitive landscape, this study describes the entire value-chain of the fertilizer industry in the Philippines, including production, importation/ exportation, and distribution. The study includes a structural screening exercise to determine whether conditions are conducive to the formation and stability of a cartel. Other potential competition issues are identified, and possible corrective measures are proposed. The study provides a detailed description of the industry, an evaluation of competition issues at each stage, an identification of potentially anti-competitive laws and regulations that affect firm entry and expansion, and recommendations on possible measures to address competition issues.

To address these objectives, the study compiled and reviewed data and related past studies; and conducted original analysis using both secondary data and field interviews to gather data not available from official sources and past research.

METHOD OF THE STUDY

Summary of past studies

Structural screening for the manufacturing sector

Identification of top ten priority sub-sectors for further research by Medalla, et al. (2018) adopt the following criteria based on the Structure-Conduct-Performance diagnostic (although *conduct* could not be measured owing to lack of data):

- *Structure*: whether there are few players in the sub-sector. The indicator is the Herfindahl index *H*, defined as the sum of squared market shares of all suppliers in the sub-sector; this is multiplied by a scaling factor (10,000). The criterion is $H > 2{,}500$.
- *Performance*: whether players in the sub-sectors are earning excess profit. The indicator is the Adjusted Price Cost Margin (APCM).

With respect to Herfindahl index: Medalla, et al. (2018) noted that indicators of market concentration should be supplemented by assessment of barriers to entry, and other supply and demand conditions. In particular: if imports can come in freely, then high firm concentration will be less indicative of market power. Moreover, are there close local substitutes? The more substitute products are available, the less significant the industry concentration index.

With respect to the APCM, derivation is as follows: Let Π denote profit per period to the investor, *K* the capital stock, *VO* be value of output (sales per period); *RM* the cost of raw materials per period; *wL* the labor cost per period, *dK* the depreciation expense per period, and *R* the per period rental payment, interest, and amortization. The profit rate is computed using her Equation 1 as follows:

$$\frac{\Pi}{K} = \frac{VO - RM - wL - dK - R}{K} \tag{1}$$

Profit rate over and above the social rate of discount *r,* is attributed to imperfect competition and is given by:

$$\frac{\Pi}{K} - r = \frac{VO - RM - wL - R}{K} - r \tag{2}$$

This is also referred to as "monopoly rent" expressed as a proportion of capital stock (though the company need not literally be a monopoly.) Medalla, et al. (2018) then state that the *r* term can be dropped if *r* is constant across industries (which it is if it approximates the social rate of discount, e.g. 10 percent). Hence, the authors proposed estimating *relative* monopoly rent using Modified Price Cost Margin (MPCM) as follows:

$$MPCM = \frac{\Pi}{K} - r = \frac{VO - RM - wL - R}{K} - 0.10$$

Note that MPCM > 0 implies a monopoly rental return to capital; in fact, the 0.10 term can be dropped, and we can simply check if *MPCM* > 0.10.

An alternative measure, the adjusted price cost margin (APCM), is shown in Equation 3:

$$\frac{\Pi}{VO} = PCM - \frac{dK + R}{VO} \tag{3}$$

Here *PCM* is the price cost margin computed as $\left(VO - RM - wL/VO\right)$; essentially, Equation (3) adjusts *PCM* by subtracting further a term for depreciation and rental payment.

The authors used the 2012 Census of Philippine Business and Industry (CPBI). The Census does not have data on capital stock; hence, the preferred indicator Π/K is unavailable. The following *caveat* was issued: "Using APCM, however, does not adequately address the earlier question about how much monopoly power is affected by capital intensity (or magnitude of capital requirement) (p.17)". In other words, reliance on the APCM to measure monopoly rent is subject to an inaccuracy, one that is more severe the greater the magnitude of the omitted term, namely the capital stock.

Sector-specific studies

The most recent sector review of Briones (2016) synthesized numerous past studies. Also germane to this study is Galang (2017), which provides a follow-up analysis. Aside from thoroughly reviewing and updating this work, this issues paper focuses on generating information and analysis different from and in addition to these two studies. Past studies have also covered many of the laws and regulations that preclude market entry and/or entrepreneurship. However, the field work (see below) elicited industry observations regarding the remaining barriers to entry due to regulations and laws.

Original analysis

Original analysis is used to illuminate forecasts of demand and supply; market structure including a profile of each major player; and as a related matter, factors that potentially limit market competition. Analysis of market structure and market competition include a structural screening exercise to determine whether conditions are conducive to the formation and stability of a cartel. The original analysis builds upon existing structural screening exercises reported in Briones (2016) and Galang (2017), which are covered in the literature review.

Future demand and supply

Forecasts of demand and supply rely on runs of the Agricultural Market Model for Policy Evaluation – Computable General Equilibrium version (AMPLE-CGE) as reported in Briones (2018). AMPLE-CGE provide scenario analysis up to 2030 or even 2040, covering a sector: "Fertilizers and Pesticides". The fertilizer component is estimated using a fixed share assumption.

Market structure

Market structure is assessed using several indicators that draw on both secondary data and field interviews:

- Retail price discrepancy (RPD);
- Margin build-up analysis;
- Asymmetric price movement analysis; and
- Four-firm concentration ratio.

To obtain the last indicator, the data used are from the Fertilizer and Pesticide Authority (FPA) and/or the Fertilizer Industry Association of the Philippines (FIAP). [1]

---

[1] *The initial plan was to use company financial statements to infer sales. However, as will be discussed below (Section 5.1.1), this was deemed an inaccurate indicator of market concentration.*

Retail price discrepancy

The *retail price discrepancy* is a modification of the more common *nominal protection rate* (NPR) as a measure of barriers to integration between domestic and foreign markets. The lack of integration implies the presence of a quantity-restricting arrangement (such as a government quota or a private cartel). The NPR is based on cost, insurance, freight (CIF) to wholesale price comparisons; however, official data on the Philippines lack wholesale prices, hence NPR cannot be calculated. What is available are *retail prices* of fertilizer, which are different from border prices of fertilizer. The retail price discrepancy (RPD) seeks to compare domestic retail prices of fertilizer with foreign retail prices using the formula:

$$RPD = \frac{RP_D - RP_F}{RP_F}.$$

Here RP_D, RP_F refer to the domestic and foreign retail prices, respectively, both expressed in common currency (i.e. USD or Php, converted at the market exchange rate). For this study the foreign country for comparison is Thailand, which is a regional neighbor that likewise uses a similar profile of fertilizers (and is also a heavy user of urea). The RPD is used here merely as an approximation for NPR, defined as follows:

$$NPR = \frac{WP_D - BP_D}{BP_D}.$$

(See **Box 1**). Note that *RPD* can also be computed from estimates given in Moya and Dawe (2007) which averages over the period 1994 to 2002 (comparing Philippines with Vietnam and Thailand), and Manalili, et al. (2016) which provides averages for 2014-2016. The analysis here updates and disaggregates the previous estimates to 2017-2018 and for monthly prices.

Asymmetric price adjustment

The *asymmetric price adjustment analysis* for fertilizer is patterned after a similar analysis by Briones (2017) for rice price. Rather than producer price to wholesale price, the market levels to be compared are *import price f.o.b.* and *domestic retail price*. When changes in import price are followed by changes in retail price (valued in USD) with equal likelihood regardless of direction of change (upward or downward), then import and domestic price behavior is consistent with that of a competitive market. However, if changes in import price are more likely to be followed by commensurate adjustments in retail price when the change is upward than when it is downward, then this is behavior inconsistent with that of a competitive market.

Box 1: Relationship between NPR and RPD

The relationship between NPR and RPD is derived as follows: suppose free-on-board (FOB) price equals WP_F, the wholesale price in Thailand; denote freight and related charges from FOB to the border as $TC_{FD} = BP_D - WP_F$. By definition, the wholesale-to-retail margins are given by the following (with obvious notation):

$$M_D = RP_D - WP_D$$
$$M_F = RP_F - WP_F$$

The ratio of NPR to RPD is as follows:

$$\frac{NPR}{RPD} = \frac{WP_D - BP_D}{BP_D} \cdot \frac{WP_F + TC_{FD} + M_F}{WP_D + M_D - (WP_F + TC_{FD} + M_F)}.$$

In case cross-border transport cost is negligible and wholesale-to-retail margins are identical (i.e. $TC_{FD} = 0, M_D = M_F$), then we have:

$$NPR = RPD\left(1 + \frac{M_F}{WP_F}\right). \quad (4)$$

The RPD will deviate from NPR by a factor equal to the wholesale-to-retail margin in Thailand expressed in *ad valorem*. The two terms are equal under a further assumption that $M_F = 0$.

Clearly even (4) is a special case, more likely to prevail between neighboring countries with similar marketing cost structure (e.g. Thailand and Vietnam) than between distant countries with differing marketing cost structure (e.g. Thailand and Philippines); the larger the freight cost, and the greater the disparity between wholesale-to-retail margins, the greater the deviation from (4).

Margin build-up

Finally, the *margin build-up* analysis traces the accumulation of marketing margin of imported fertilizer, through the various stages of marketing, i.e. importer, distributor (wholesaler), and dealer (retailer). At each stage, the accumulation of the margin is estimated, together with associated marketing costs, allowing the computation of an excess margin at each stage. The data are collected from field interviews of imported fertilizer distribution chain in major fertilizer-using regions, namely Central Luzon (focusing on the provinces of Bataan, Pampanga, and Nueva Ecija) as well as Ilocos Region (focusing on La Union and Pangasinan). The chain is identified by interviewing individual farmers, and then by snowball sampling, tracing backwards to the dealers, distributors, area distributors, and importers.

The hypothesis is that the excess margin at each stage is minimal, i.e. the marketing margin at each stage is almost entirely a payment for marketing cost. The alternative is that excess margin at some stages may be disproportionately large, suggesting failure of competition at that stage.

THE FERTILIZER INDUSTRY OF THE PHILIPPINES

Biology of fertilizer application

Plant nutrients

Plants need various nutrients to grow. Of the chemical elements, about 16 are required by plants, divided into nine *macronutrients* (nutrient requirement equal to at least 0.1 percent of the plant's weight) and seven *micronutrients*. Of the nine macronutrients, three (Carbon, Hydrogen, Oxygen) are obtained from the natural process of photosynthesis. Of the remainder (Magnesium, Nitrogen, Phosphorus, and Potassium), the last three are most easily depleted in normal soil, especially for high yield varieties. Their functions are as follows:[2]

- **Nitrogen (N)**: promotes rapid plant growth and improves grain yield and grain quality through higher tillering, leaf area development, grain formation, grain filling, and protein synthesis.
- **Phosphorus (P)**: for root development, tillering, early flowering, and ripening.
- **Potassium (K)**: plays an essential function in osmoregulation, enzyme activation, regulation of cellular pH, cellular cation-anion balance, regulation of transpiration by stomata, and transport of photosynthetic products. It aids in tillering and increasing the size and weight of the grains; increases vigor and resistance to some rice diseases; and strengthens straw and stems of the rice plant.

These constitute the most common macronutrients supplied by chemical fertilizers. N is needed during the entire vegetative phase of a plant but is easily lost by volatilization and leaching. Hence, N should be applied in several portions or splits (2-3). Meanwhile P and K are needed mostly early in crop development; these nutrients can remain longer in the soil, and can be applied in two or fewer splits, early in the cropping season.[3]

Other agroclimatic factors

Nutrients are not the only factor behind plant growth and yield. Water is crucial, as is air (e.g. carbon dioxide), and *sunlight*, both of which are necessary for photosynthesis.[4] In general, a plant that is exposed to sunlight longer is able to produce more energy for growth and seed production (Campillo et al., 2012). In monsoon Asia, exposure of plants to the sun greatly depends on the cropping

---

[2] http://www.knowledgebank.irri.org/ericeproduction/bodydefault.htm#IV.3_Nutrient_calculator.htm.
[3] http://www.knowledgebank.irri.org/ericeproduction/IV.3_Nutrient_calculator.htm
[4] https://www.cropsreview.com/climatic-factors.html.

season. Sunlight exposure is longer in the dry season than in the wet season, hence the potential for a high yield is greater, provided enough nutrients and water are in place, and other stressors (excessive heat, disease, etc.) are absent. Hence, the nitrogen requirement may be larger during the dry season given longer sunlight exposure. On the other hand, yield response to N is lower during rainy season owing to lower exposure to sunlight, hence the agronomic recommendation is to apply lower N (Witt et al., 2007). As mentioned previously, P and K tend to be stored in the soil, hence P and K requirement vary less with the season compared with N. The difference in nitrogen efficiency is true for other temporary crops with a 3-4 month lifespan planted in two or more seasons, e.g. corn. It is less of an issue say for tobacco (cropped only in the dry season) or sugarcane (cropped once a year).

Product categories

Major fertilizer grades

The FPA defines fertilizer as *any substance, solid or liquid, inorganic or organic, natural or synthetic, single or a combination of materials that is applied to the soil or on the plant to provide one or more of the essential nutrients to improve plant nutrition, growth, yield or quality, or for promoting a chemical change that enhances plant nutrition and growth*. Various types of products meet this definition, namely inorganic fertilizers (classified as traditional, new grades, specialty grades, and controlled release); and organic fertilizers (Box 2).

The traditional grades are usually described using their respective N, P, and K content by mass, i.e., 46-0-0 denotes 45 percent Nitrogen, 0 percent Phosphorus, and 0 percent Potassium, and so on. The main traditional grades are as follows:

1) 46-0-0: Urea
2) 21-0-0: Ammonium Sulfate (ammosul)
3) 16-20-0: Ammonium Phosphate (ammophos)
4) 18-46-0: Diammonium Phosphate (DAP)
5) 14-14-14: Complete Fertilizer (NPK)
6) 0-0-60: Muriate of Potash

The two simple fertilizers are *urea*, which is applied to correct nitrogen deficiency; and muriate of potash, to address potassium deficiency. The rest are complex or compound fertilizers, meaning a combination of two or more macro-nutrient fertilizers. Ammosul also provides nitrogen, but in lower concentration than urea, while also supplying sulphur. Ammophos meanwhile provides a low concentration of nitrogen, but also provides phosphorus. A variation on this is diammonium phosphate (DAP) where the respective macronutrient concentrations are higher. However, if potassium is also required, then the farmer may apply NPK, which provides all the major macronutrients.

Substitution across grades

The degree to which the various grades are substitutable are entirely dependent on the nutrient content. In terms of nitrogen application, a sack of urea can be substituted by 2.14 sacks of ammosul, or a sack of ammosul by 0.467 sacks of urea. Suppose sulfur deficiency is not an issue, and both urea and ammosul are equally available to the farmer, then it is worth substituting 1 sack of ammosul by 0.47 sacks of urea if ammosul price is more than 46.7 percent the price of urea (conversely, urea less than 214 percent the price of ammophos); this will result in cost savings. On the other hand, if ammosul price is less than 46.7 percent the price of urea (conversely, urea is more than 214 percent the price of ammosul), then it is worth replacing 1 sack of urea by 2.14 sacks of ammophos.[5] The substitution is entirely the farmers' decision; as Dealers typically have a variety of grades on sale, the substitution decision poses no constraint to the Dealer.

Box 2: Categories of fertilizer

- **Inorganic fertilizer** - fertilizer product whose major nutrients (NPK) are supplied by inorganic/mineral or synthetic/chemical compounds.
  - **Traditional Inorganic Fertilizers:** are those registered with the FPA for at least 10 years, available in the market and widely used in the country.
  - **New Grades:** fertilizers with no previous registration with the FPA.
  - **Specialty Grades**: fertilizer products recommended to overcome a specific problem or supply the nutrient need
  - **Controlled Release Fertilizer**: provides nutrients slowly throughout the growing season or longer
- **Organic Fertilizer**: product of plant or animal origin that has undergone decomposition through biological, chemical or any other process where the original materials are no longer recognizable, free from any pathogens, soil-like in texture, contains not less than 20% organic matter, oven-dry basis and can supply nutrients to plants
  - **Plain Organic fertilizer**: an organic fertilizer material not enriched with microbial inoculants, plant growth substances and/or chemical ingredients to increase its nutrient content with total NPK of 5-7%.
  - **Compost/Soil Conditioner**: an organic fertilizer material or any decomposed product of plant or animal origin, which is not enriched with microbial inoculants, plant growth substances and/or chemical ingredients to increase its nutrient content to a total NPK of 3-4%.
  - **Fortified/Enriched Organic Fertilizer**: any decomposed organic product of plant or animal origin is enriched/spiked with microbial inoculants, plant growth substances and/or chemical ingredients to increase its nutrient content to a minimum total NPK of 8%.

Source: FPA (2013)

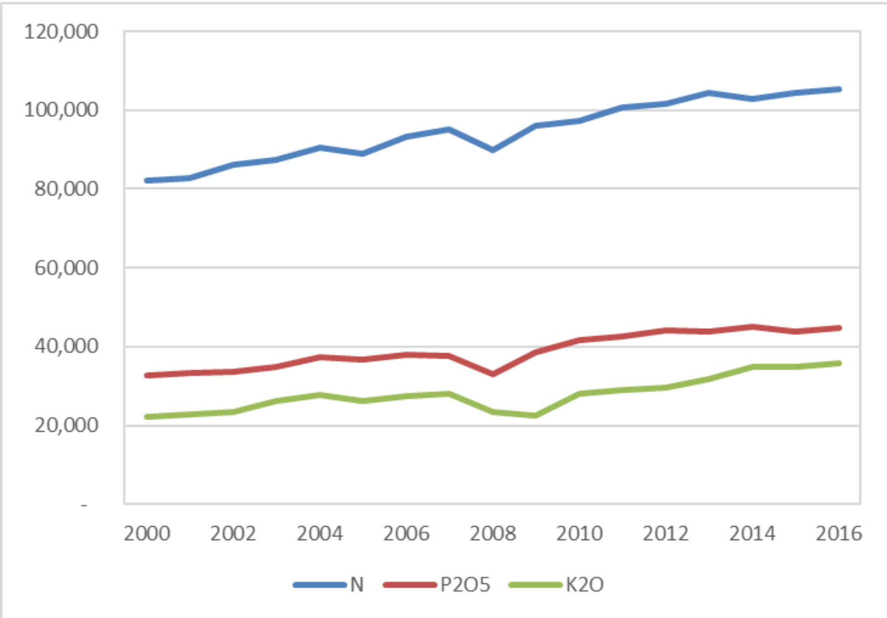
[5] *In April 2019, ammophos was 54.7 percent the price of urea (Php 631.45 per sack, versus Php 1153.59 per sack), making it worthwhile to switch from ammosul to urea.*

Global context and outlook

Global consumption and outlook

Worldwide consumption of fertilizers is on an upward trend (Figure 1). Global consumption of nitrogen rose from about 80 million tons in 2000 up to 105 million tons in 2016. Similarly, phosphate (P2O5) as well as potash (K2O) increased from 33 million tons and 22 million tons, respectively in 2000, up to 45 million tons and 36 million tons, in 2016. The fastest annualized growth over the period was for potash (3.3 percent), followed by phosphate (2.1 percent), with nitrogen growing slowest (1.7 percent).

Figure 1: Global consumption of fertilizer by macronutrient, in '000 tons

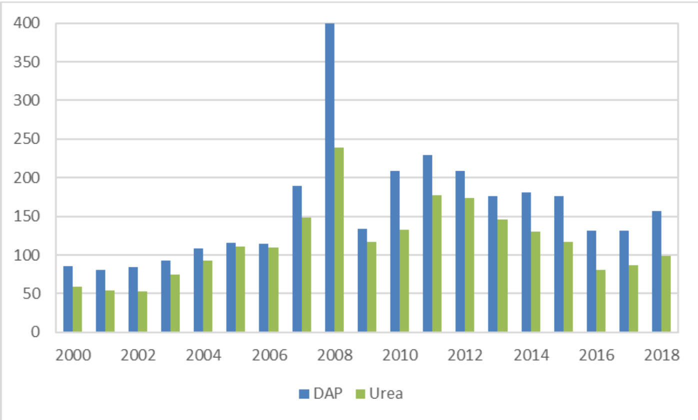


Source: International Fertilizer Association (2019)

The price of urea and DAP is available from World Bank (2019); both series from 2000 (deflated by US CPI) shows a gently rising trend until 2007-2008, when prices spiked as petroleum prices soared (Figure 2). Prices corrected quickly in 2009 and have moved erratically since then.

The global supply outlook remains favorable given developments in production capacity worldwide. First, global urea capacity is projected to increase by a net 10 million tons or 5 percent, to 226 million tons in 2022, with ammonia capacity projected to expand by 3% from 2017 to 2022 despite plant closures in China, as large capacity increases are expected in Africa, South Asia, Eastern Europe, and Central Asia. Second, phosphate rock supply is expected to increase by 9 percent in 2018; Africa and West Asia would together account for 80% of the net increase. No shortage is anticipated in the near future. Third, global potassium capacity is forecast to rise overall by 10 percent.

Figure 2: Deflated prices of urea and DAP, USD per ton (1983 = 100)

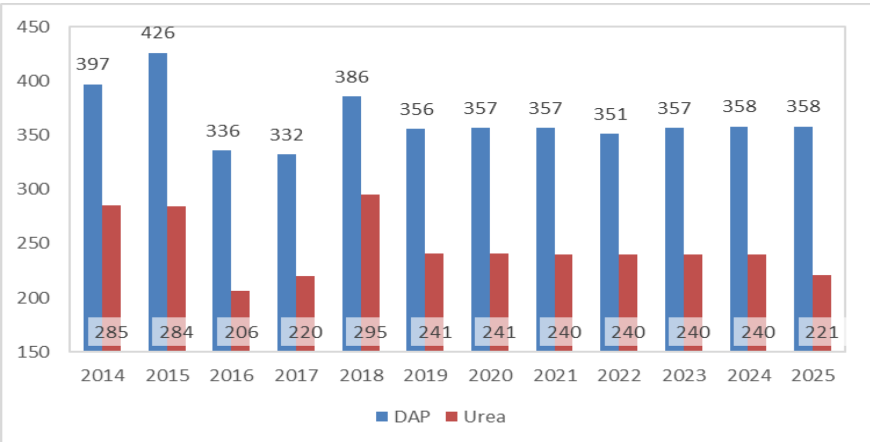


Note: Price of urea is FOB, Ukraine, Black Sea; DAP is spot price FOB, US Gulf.

Sources of basic data: US Bureau of Labor Statistics (2019); World Bank (2019).

Forecasts of world price are shown in Figure 3, from 2019 onward. The projection sets a world price of urea and DAP somewhat lower than their base 2018 prices; the projected prices are stable at around USD 356–358 per ton until 2025 for urea; and USD 221–241 per ton for DAP until 2025.

Figure 3: Projections on world price, constant USD per ton



Source: World Bank (2019).

Issues in international supply and competition

Fertilizer production is well known to be subject to enormous fixed capital investments, and therefore large economies of scale. Moreover, countries owning sources of raw material and capable of making the large-scale investments tend to dominate the industry worldwide. Torero and Hernandez (2013) have found that global production of nitrogen, phosphate, and potash fertilizers is heavily concentrated among a few countries, with over half of world production of the following fertilizers located among the top five producing countries:

- Urea: China, India, Indonesia, Russia, USA (59.9 percent)
- Potash: Canada, Russia, Belarus, Germany, China (76.4 percent)
- Di/Mono Ammonium Phosphate (DAP/MAP): China, USA, India, Russia, Morocco (66.9 percent)
- NPK: China, India, Russia, France, Turkey (50.5 percent)

Moreover, domestic production within each of the aforementioned countries is also heavily concentrated among a few companies. In most cases, the top four companies account for over half of the country's production capacity. For potash in particular, the top four companies account for all production capacity in Canada, Russia, Belarus, and Germany.

Such high concentration has had deleterious impact on competition at the level of the global fertilizer market. Econometric analysis suggests that a 10 percent decrease in the four-firm concentration ratio (in terms of production capacity) reduces world fertilizer prices by 8.2 percent.

The domestic fertilizer industry: trends and outlook

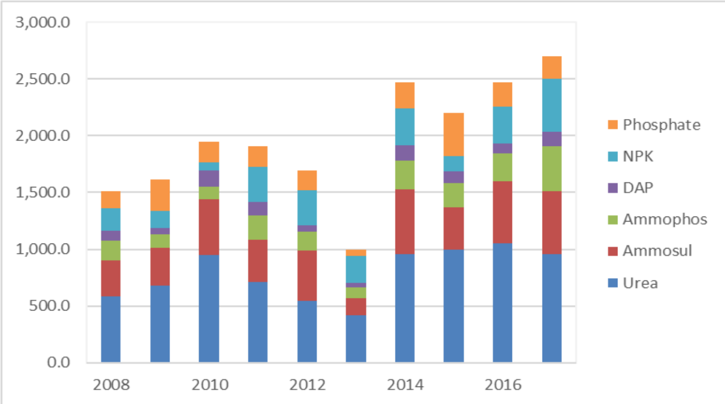
Supply and demand trends

The FPA monitors supply and demand data for the 6 major fertilizer grades. It also monitors stock, inventory and sales data; price data is monitored on a weekly basis for the six major fertilizer grades. However, sales data is usually delayed, for as long as several years, as not all companies submit their sales data on time. Data on importation is seen to be more accurate and more timely as this is based on Certificate of VAT exemption secured by importers. Ignoring storage (see Section 3.4.4), domestic consumption may be inferred using the equation:

Production + Imports – Exports = Domestic Utilization

Figure 4 presents a graph of domestic utilization for the major fertilizer grades. The quantity of fertilizers has been increasing over the period 2007–2017. However, there appears to have been a drop in consumption in 2010–2013, bottoming out at below one million tons. However, this seems to be an underestimate owing to poor data for these years. From 2013 onward, there has been a rapid growth in fertilizer utilization, reaching 2.7 million tons by 2017. Among the fertilizer grades, the largest by quantity is urea (35.5 percent), followed by ammosul (20.5 percent). The third largest is complete fertilizer at 17.4 percent.

Figure 4: Domestic utilization by major grade of fertilizer, '000 tons, 2007 - 2017



Source: FPA (2019).

Breakdown of domestic utilization by account (production, imports, and exports) is shown for all major fertilizer grades, as well as the top three, in Table 1.

Table 1: Supply and utilization accounts, top three fertilizer grades, 2007–2017, tons

	2007	2010	2013	2016	2017
All fertilizers					
Production	469,312	35,843	280,679	313,773	399,123
Imports	1,061,337	1,911,344	767,702	2,166,839	2,314,615
Exports	71,528	3,380	53,329	11,252	14,104
Domestic utilization	1,459,121	1,943,807	995,052	2,469,360	2,699,634
Import penetration (%)	72.7	98.3	77.2	87.7	85.7
Urea					
Production	-	-	-	-	-
Imports	656,517	946,295	418,852	1,051,121	958,587
Exports	-	-	-	-	-
Domestic utilization	656,517	946,295	418,852	1,051,121	958,587
Import penetration (%)	100.0	100.0	100.0	100.0	100.0
Ammonium sulfate					
Production	-	-	-	53,975	-
Imports	41,053	494,985	169,444	492,250	554,384
Exports	18,200	-	19,554	-	-
Domestic utilization	22,853	494,985	149,890	546,225	554,384
Import penetration (%)	179.6	100.0	113.0	90.1	100.0
Complete fertilizer					
Production	269,296	25,552	216,399	166,010	248,052
Imports	53,608	48,207	25,415	158,375	223,678
Exports	-	-	-	-	2,700

	2007	2010	2013	2016	2017
Domestic utilization	322,904	73,759	241,814	324,385	469,030
Import penetration (%)	16.6	65.4	10.5	48.8	47.7

Source: FPA (2019)

Nitrogen-based fertilizers (urea and ammosul) are virtually all imported as they are not domestically produced. On the other hand, there is a sizable domestic production of complete fertilizer (although the raw materials are also largely imported); in 2017 though imports had mostly caught up with domestic production. Overall, import penetration average has been at 86 percent from 2007 to 2017; in the Table the highest import penetration was close to 100 percent in 2010, and the lowest was 73 percent in 2007. Even domestically produced compound fertilizer must contend with high import penetration ratios of about fifty percent or higher. Hence, high concentration of domestic production is an incomplete indicator of market concentration.

Utilization tends to be erratic from year to year, hence annualized growth rate (between 2007 and 2017 figures) shows fastest growth for Ammonium phosphate (from a small base), equivalent to 9.5 percent. Growth rates per annum for urea and complete fertilizer utilization is nearly identical at 3.8 to 3.9 percent.

Fertilizer sales (in Php) may be estimated from the proportion of fertilizer cost in gross returns by crop, based on cost and returns data (Table 2).[6] Utilization of fertilizer outside crop production (i.e. aquaculture, and even as feed mix) is negligible.

Note that for assorted Other crops, the proportion of fertilizer cost in gross returns is the weighted average of the same proportion for the crops identified in the Table; Other crops account for about 42.5 percent of output by value, and include such big ticket items as coconut and banana; unfortunately, cost and returns data from PSA is unavailable for these crops.

Estimated fertilizer sales is about Php 58 billion, equivalent to 6 percent of the value of output of the crops sector. Estimated fertilizer sales by crop are dependent on two factors: a) the value of output of the crop itself; b) the proportion of fertilizer in total costs/sales.

[6] *These estimates assume fertilizer cost is a fixed proportion of value of output. Strictly speaking the most recent available cost and returns data, being in 2017, should be applied to value of production in the same year. By applying on 2018 we trade off a little inaccuracy for a more updated estimate.*

The crop with the highest ratio of fertilizer cost to sales is coffee, followed by corn; in palay, fertilizer expense is equivalent to about 5.4 percent of output. Nonetheless, palay is estimated to be the biggest user of fertilizer by quantity, as it accounts for the largest value of production among all the crops. The second largest user is corn, which also has a large output value; together these crops account for 47.1 percent of estimated fertilizer sales. At distant third is mango at 4 percent of fertilizer sales.

Table 2: Estimated fertilizer sales in 2018, by crop, in Php millions

	Estimated fertilizer sales	Percent of total fertilizer sales	Ratio of fertilizer cost to total sales	Value of output
CROPS	58,145.31	100.0	0.0603	964,622
Palay	18,774.30	32.3	0.0536	350,132
Corn	8,618.61	14.8	0.0914	94,296
Coffee	756.26	1.3	0.1304	5,798
Pineapple	940.83	1.6	0.0369	25,489
Mango	2,327.81	4.0	0.0805	28,934
Peanut	9.07	0.0	0.0077	1,185
Mongo	1.78	0.0	0.0009	1,887
Cassava	711.12	1.2	0.0358	19,869
Camote	102.55	0.2	0.0120	8,545
Tomato	289.00	0.5	0.0808	3,579
Garlic	16.85	0.0	0.0253	665
Onion	217.81	0.4	0.0396	5,507
Cabbage	173.39	0.3	0.0812	2,135
Eggplant	429.73	0.7	0.0836	5,139
Calamansi	89.95	0.2	0.0468	1,922
Other crops	24,686.25	42.5	0.0603	409,541

Source: FPA (2019)

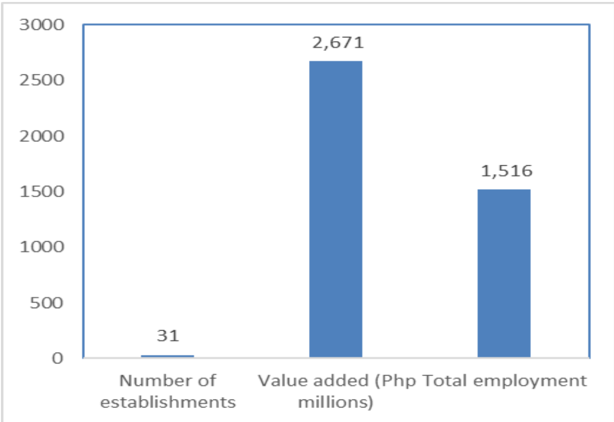
Demand for fertilizer

In the Philippines, a number of studies reviewed in Briones (2016) for rice farming have found that rice farmers are under-applying nitrogen fertilizer, compared with optimal levels of fertilizer application, particularly in irrigated areas and during the dry season. Possible explanations are sorted into three categories, namely: i) External constraints – pertains to production problems that vitiate nutrient management, e.g. unreliable irrigation service, and lack of access to credit to purchase fertilizers; ii) Risk attitude – despite higher net income from additional nitrogen fertilizer, the farmer may find the short term investment in higher nitrogen application too risky; iii) Internal constraints – farmers may not be convinced that more nitrogen fertilizer will increase profit, despite scientific evidence to the contrary; or they may agree with the evidence, but find themselves unable to save enough money upfront to pay for additional fertilizer cost. The evidence reviewed in Briones (2016) finds that external constraints are unlikely explanations for the suboptimal application of nitrogen; further study is needed to pinpoint whether risk attitude or internal constraints are better explanations.

Supply of fertilizer

Based on the Annual Survey of Philippine Business and Industry (ASPBI), in 2015, fertilizer manufacturers number only 31 throughout the country (Figure 5). This is consistent with the presence of significant scale economies in production owing to large capital investments. Hence, the APCM need not entirely be attributed to rent, as a large portion may be compensating for capital outlays. Output of the industry (measured by value added) reached Php 2.7 billion, a mere 0.2 percent of manufacturing output. The industry as a whole employed just 1,561 workers (0.1 percent of total manufacturing employment).

Figure 5: Statistics on domestic manufacture of fertilizer and nitrogen-based compounds, 2015



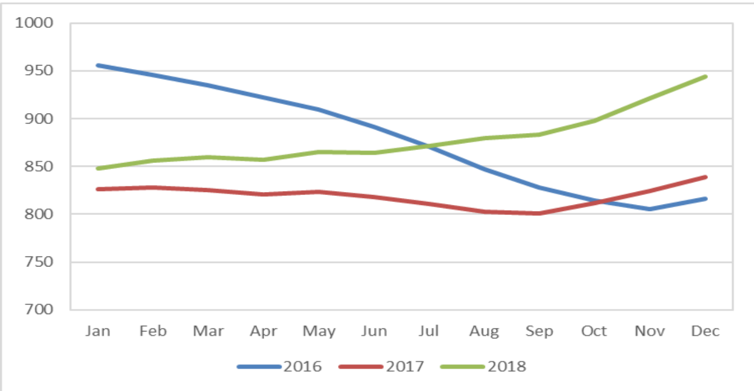
Source: PSA Openstat.

Prices, seasonality, and storage

Figure 6 shows the price of urea on monthly basis over a recent three-year period. Price was on a declining trend in 2016, but relatively steady in 2017. It started to increase in 2018. This closely followed the trend in the international price of urea, which declined in 2015-2016, remained stable at 2016 levels in 2017, but increased in 2017-2018. Another important feature to notice is the absence of seasonal patterns in the price of fertilizer. This is despite strong seasonality in underlying demand owing to the crop calendar for palay and corn (the two largest users of urea), which tend to use the nitrogen fertilizers heavily early in the planting season, but tapering off as the plant achieves full growth towards the end of the season. It appears that the stronger driver of monthly price is the international market rather than local variations in demand.

Fertilizers can in general be stored over long periods as long as they can be kept clean and dry, although urea is vulnerable to caking, and requires extra care to keep it in good condition. The bigger cost of storing fertilizer is not physical, but rather the opportunity cost of capital. If price exhibited a strong seasonal pattern, then it might be worthwhile for the trader to store fertilizer to undertake intertemporal arbitrage. However, the lack of price seasonality suggests that there is little incentive for the trader to store fertilizer for this purpose.

Figure 6: Monthly price of urea fertilizer, Php per bag, 2016 - 2018



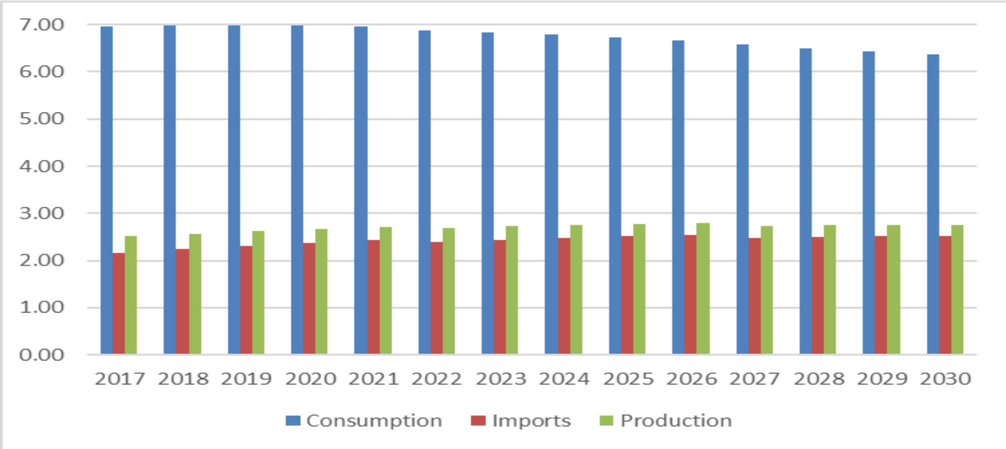
Source: PSA Openstat.

Forecasts of domestic supply and demand

Projections for future demand of various sectors for 2017- 2030 is available from Briones (2018). One of these sectors is Pesticide and Fertilizer manufacturing. Assuming that growth rates apply equivalent to sub-sectors, the growth rate for fertilizer consumption, production, and imports, is shown in Figure 7.[7]

[7] *In fact, between 2003 and 2013, GVA for the Manufacturing of fertilizers and nitrogen compounds was Php 8.81 billion, while that of Manufacturing of Pesticides and other agro-chemicals was Php 5.56 billion, using PSA Input-Output Table data. GVA in current prices in 2013 for the former was only Php 2.78 billion, while that of the latter was Php 2.67 billion, using ASPBI data. Hence contraction of GVA in current prices was 50 percent in the case of fertilizers and nitrogen compounds, while that of pesticides and other agro-chemicals was as high as 70 percent. Admittedly, equal growth rates/constant GVA shares did not hold, though compositional stability at the baseline may be more plausible in the medium term.*

Figure 7: Projected growth rates of consumption, imports, and production of pesticide and fertilizer products, 2017–2030 (%)



Source: Briones (2018)

Note that the projection is derived from a CGE model using a 2016 Social Accounting Matrix, which in turn incorporates input-output relationships as found in the 2006 input-output table. Hence the projection already incorporates domestic supply and imports of fertilizers, as well as demand from the various crops (and changes in crop composition).

Growth of consumption is projected to remain robust throughout the period, with the fastest growth in the years 2017–2021, tapering off in later years. Meanwhile production and import growth tends to slightly accelerate from 2017 to 2021. Note that this projection already takes into account the impact of the Republic Act No. 11203 (the Rice Tariffication Law).

Geographic markets

Based on rice and corn utilization, the highest demand for fertilizer is in Region II, followed by Region III (Table 3). The next highest demand is in Region VI, followed by Region I. The national application rate for rice and corn areas is 5 bags per hectare (ha). Region II also has the highest application rate at 7 bags per ha, followed by Region I; application rate in Region II is also quite high, at 6.1 bags per ha. The lowest application rates are found in Mindanao (ARMM and Region XI) and in Visayas (Region VIII). Note that these figures underestimate true fertilizer demand; the largest discrepancies are likely to be found in Region VI (the largest sugarcane area); as well as Region X, XI, XII (banana and pineapple plantation areas).

Among the fertilizer grades, urea is most commonly used; it accounts for 46 percent of total – rising to 62 percent in Region IV-A. The second largest is ammosul, making nitrogen the key macronutrient being applied.

Table 3: Fertilizer application in rice and corn areas, tons

	Application (tons)	Share in total (%)	Bags per ha	Urea share (%)
CAR	45,268	2.8	6.0	56
Region I	156,641	9.7	6.7	48
Region II	301,933	18.7	6.1	54
Region III	266,829	16.6	7.0	40
Region IV-A	29,572	1.8	4.0	62
Region IV-B	78,042	4.8	5.3	47
Region V	74,624	4.6	3.6	48
Region VI	171,345	10.6	4.8	36
Region VII	50,636	3.1	3.5	28
Region VIII	25,537	1.6	2.3	48
Region IX	75,965	4.7	3.9	40
Region X	111,706	6.9	5.6	42
Region XI	36,113	2.2	3.5	43
Region XII	124,003	7.7	4.1	51
Region XIII	32,894	2.0	3.6	36
ARMM	29,285	1.8	2.5	44
Philippines	1,610,394	100.0	5.0	46

Source: PSA (2019).

Trade and international price comparison

Earlier we had seen how imports account for a significant share of domestic utilization of fertilizer. Almost all of the top two fertilizer grades (urea and ammosul) are imported. Imports (by quantity) of nitrogenous and complex fertilizers are shown in Table 4, which is obtained from *Trademap*. The imports reported in the international statistics are higher than the supply and demand figures from FPA. The biggest source of fertilizer imports is China, followed by Indonesia. All these countries, as well as the other major sources (Vietnam and South Korea) are members of the expanded ASEAN free trade areas.

Table 4: Imports of nitrogenous and complex fertilizers, Philippines, by source, in tons

	2007	2009	2011	2013	2015	2017
World	797,916	520,919	1,007,985	1,466,790	1,412,517	2,276,012
China	153,533	77,147	140,049	322,057	278,460	418,498
Indonesia	463	2	10,283	29,708	10,824	102,713
Vietnam	-	14,332	31,354	51,763	64,202	58,978
South Korea	42,000	53,006	46,394	23,570	28,901	61,260
Other countries	601,920	376,432	779,905	1,039,692	1,030,130	1,634,563

Source: Trademap (2019).

Manalili, et al. (2016) conducted a survey of urea prices in various Asian countries in 2013-14; they found that price of urea in Vietnam was about 11 percent lower than that of Philippines, while that of Thailand was 15 percent lower. In these countries, fertilizer is not subsidized, hence their price levels are comparable. Only in countries in which fertilizer is heavily subsidized, such as India and Indonesia, is there a remarkable difference in price: for instance, the price of urea in India is less than a fifth than that of the Philippines, while that of Indonesia is 34 percent lower. Such price differences are much higher than levels reported in Moya and Dawe (2007) for 1994–2002, where the price of urea in Vietnam and Thailand was only about 8% lower than in the Philippines.

Policies and regulatory environment

Product registration

There are two levels of product registration: *Full registration* is provided when all requirements are satisfied, including 2 seasons of efficacy tests for a representative crop. *Provisional* or *Conditional Registration* is granted if there is only one season of efficacy test with significant results on a representative crop. Registration requires the following:

- Name/address of applicant
- Brand name
- Guaranteed/declared composition
- Certificate of Analysis from an FPA-recognized local laboratory or Certificate of Analysis from the supplier. If there is no local laboratory capable to do the analysis, this can be done abroad. The laboratory must be independent, reputable and has the capacity as certified by the Philippine Embassy. Results of analysis may be authenticated by the Philippine Embassy.
- Name of supplier and country of origin (imported products)
- Size/type of packaging
- Description of manufacturing/production process

- Source and kind of raw materials
- Sample of the Product (Solid-Inorganic: 250 g to 1 kg, Liquid: 250 mL to 1 L, Microbial Inoculants: 2 pcs of 200 g or 200 mL)
- Methods of analysis
- Test for heavy metals, if needed
- Compliance with labeling requirements

Fertilizer Handlers

A Fertilizer Handler is an Exporter, Importer, Import consolidator, Manufacturer, Processor, Bulk blender, Formulator, Repacker, Distributor, Indentor, Bulk handler, and Dealer-repacker of fertilizer inputs. The various types of Handlers are as follows (Table 5):

- **Importer-End-User**: commercial plantations, which import and use the fertilizers directly for their consumption and private research institutions or companies that import or use fertilizers for testing purposes.
- **Importer**: person engaged in the importation of fertilizer as a business and sells to distributors.
- **Distributor**: person who sells fertilizer products to dealers and outlets only.
- **Area Distributor**: person who sells fertilizer products to dealers and outlets in a certain area that typically covers a wider geographic scope than a Distributor.
- **Bulk Handler**: person engaged in handling the fertilizer either in bulk or in bag which include bagging and hauling from the port to the warehouse.
- **Exporter**: person who sells fertilizer products to other countries.
- **Indentor**: person who orders fertilizer products from suppliers of other countries.
- **Repacker**: refers to any fertilizer companies duly authorized to engage in retailing fertilizers and other new grades except nitrates, in smaller quantities.
- **Dealer-Repacker**: FPA-licensed dealers duly authorized to engage in retailing traditional, solid and inorganic fertilizers except nitrates, in smaller quantities.
- **Manufacturer/Processor/Bulkblender/Formulator**: person engaged in preparing, mixing or manufacturing fertilizer as a business.
- **Mango Contractor**: refers to person(s)/entity(ies) who enter into a contract with a mango grower to service his trees (from flower induction to harvesting) for a fee or on a sharing basis.
- **Supplier**: refers to any business entity which sells fertilizer products to importers.

- **Import-Consolidator**: person who represents and assists eligible agricultural enterprises which have small size orders or lack direct import experience.

Each of these Handlers must have a License to Operate issued by the FPA. Also regulated by the FPA are **Dealers**, which are establishments authorized to retail fertilizer products. A maximum of 12 requirements (for manufacturers/blenders) are mandated; typically, there are 9–11 requirements. All licenses need to be renewed yearly, except Dealers and Dealer-Repackers, whose licenses are valid for 3 years.

Table 5: Licensing requirements for fertilizer handlers

	Importer-End User	Importer	Distributor	Area Distributror	Bulk handler	Exporter	Indentor	Repacker	Manufacturer/ Processor/Blender	Dealer	Dealer-Repacker	Mango contractor
Duration of license (Years)	1	1	1	1	1	1	1	1	1	3	3	1
Notarized application form	x	x	x	x	x	x	x	x	x	x	x	x
CTC of Articles of Incorporation (SEC)[1]	x	x	x	x	x	x	x	x	x	x	x	x
CDA Registration[2]	x	x	x	x	x			x	x	x	x	x
CTC DTI Permit, Mayor's Permit[3]	x	x	x	x	x	x	x	x	x	x	x	x
CTC of ITR and FS	x	x	x	x	x	x	x	x	x			
Product registration	x	x	x	x	x	x		*	x	*	*	x
Distributorship agreement[4]	x	x	x	x				x				
Registration of warehouse	x	x	x	x	a				x	***	x	x
List of fertiliser products to be handled		a	x	x		a	a	x	x	x	x	
Inspection report (from FPA field office)	x	x	x	x	x	x		x	x	x	x	x
List of bulk handling equipment					x							
Inspection report of plant site, etc.									x			
Certificate of source and analysis						x						
Copy of contract with manufacturer							x					
Mining permit (MGB)									x			
ECC from DENR									x			
Weighing scale at POS								x		x	x	
Certificate of membership in association										x	x	x
Certificate of Dispenser Training										x		
Mango Contractor's Training												x

[1]For SEC-registered corporations.

[2]For cooperatives.

[3]For sole proprietorships.

[4]Or equivalent

**All fertilizers sold or repacked must be registered*

***Disposition of restricted fertilizer imports (nitrates) only allowed for licensed mango contractors*

****Optional.*

[a]If applicable.

Source: FPA (2013).

Taxation

Unlike other manufactured products, fertilizers are exempted from the value added tax of 12 percent. To avail of VAT exemption, a fertilizer trader, importer, or manufacturer, must obtain a Certificate of VAT Exemption from FPA.

This acts as an effective subsidy on fertilizer production and utilization. Previously there were explicit subsidies for fertilizers integrated into various agricultural products of both Department of Agriculture (DA), Department of Agrarian Reform (DAR), and Local Government Units (LGUs). However, the controversies associated with such programs led to the termination of explicit subsidies. Currently, fertilizer subsidies—i.e., government providing free or low-cost fertilizer—are built into existing programs such as model farms (under the agricultural extension program).

Trade policies

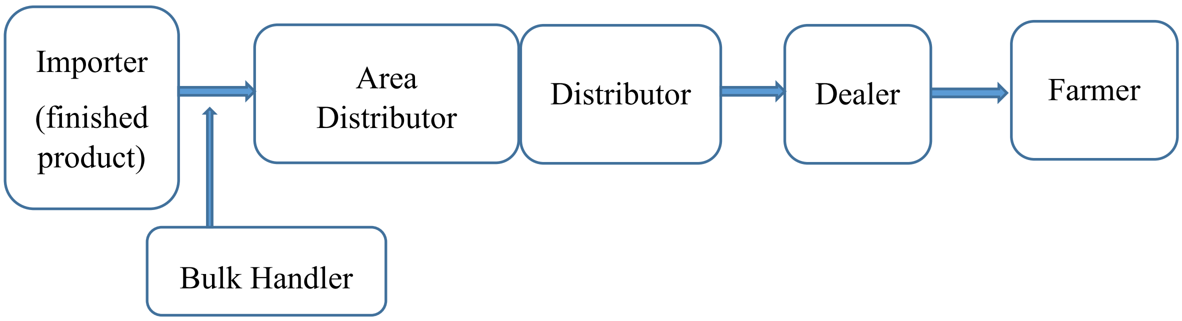
Briones (2016) has discussed extensively the adoption of liberalized trading regime since 1986. The various regional trade agreements centered on the ASEAN already provide for zero tariff on all types of chemical fertilizer – this covers ASEAN Plus trading partners such as China and South Korea. Moreover, even MFN rates under the WTO are already at low levels, i.e. 1 percent for urea and other nitrate fertilizers; 3 percent for ammonium-based fertilizers; and 7 percent for feed-grade fertilizers, i.e. may be used as ingredient for animal feed.

Description of marketing chain

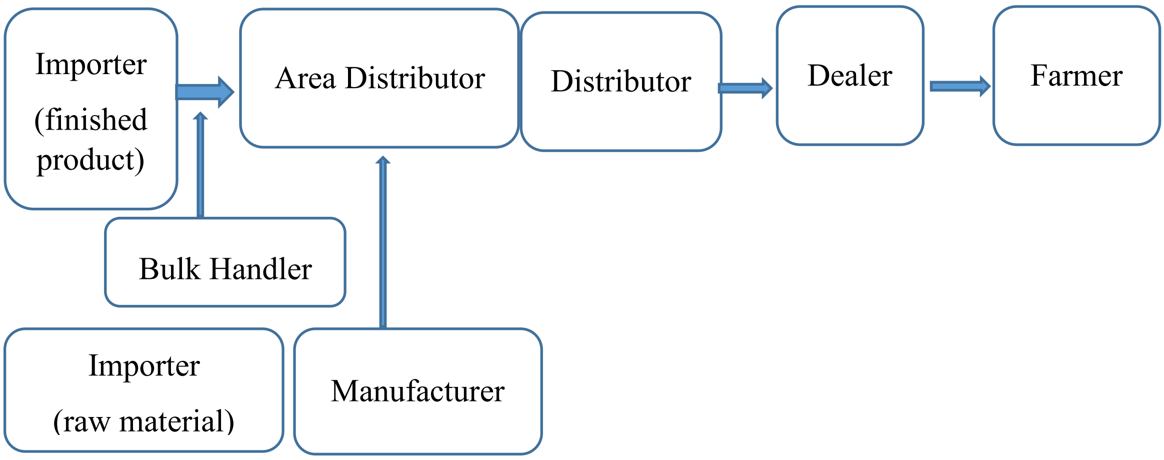
A schematic diagram of the marketing chain is shown in Figure 8. Case 1 pertains to urea and nitrogen-based fertilizer are not domestically produced, only imported in finished form. The fertilizer arrives at a Philippine port, where it is repacked into branded bags of the importing company by the Bulk Handler, who is a service provider to the importer.

Figure 8: Schematic of marketing chain for fertilizer

Case 1: Only imported



Case 2: Both domestically produced and imported



This is then sold to National/Area Distributors, which are larger versions of Distributors, who are wholesalers. Distributors can source directly from importers depending on proximity of the Distributor to the port. From the Distributor the fertilizer is sold to Dealers who are retailers; the Dealers in turn sell to farmers. In some cases, the Dealer is itself a farmer-owned cooperative, in which case the farmer receives back the margin in part via patronage refund.

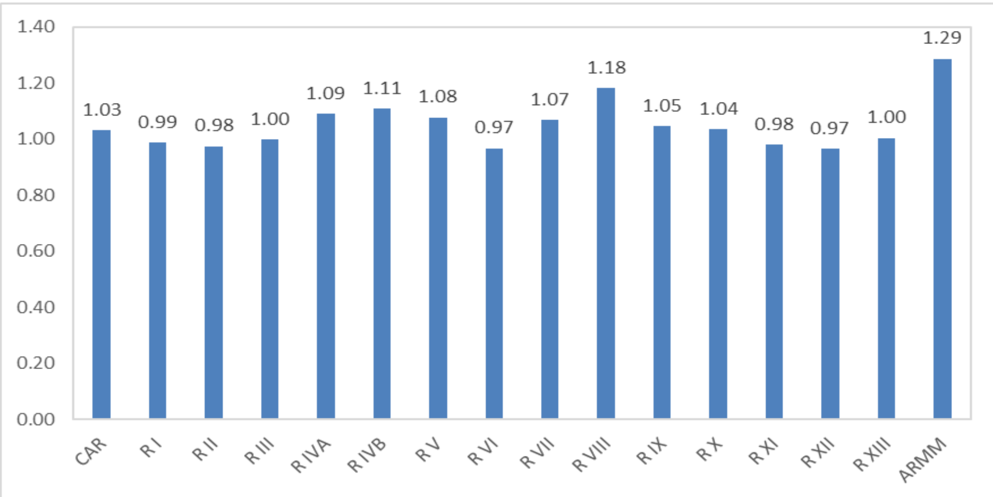
Meanwhile mixed fertilizers such as NPK can be domestically produced, as well as imported in final form; for the latter the marketing chain becomes a true value chain fertilizer. Note that even Manufacturers of fertilizer still mostly obtain their raw materials from imports, i.e. urea, phosphate rock, or potash, which they then blend into any one of several compound fertilizers. Imports can be made directly by the manufacturer or coursed through an importer. Area Distributors/Distributors can source the finished product from an importer or from a manufacturer. Afterwards, the remainder of the marketing chain is identical to the first case.

ANALYSIS AT THE RETAIL LEVEL

Spatial distribution of prices and dealers

Briones (2016) showed that certain regions of the country will normally have higher fertilizer prices than others; Figure 6 provides an example for urea price. Region III is used as basis for the regional index; Regions I, II, VI, XI, XII, have lower urea prices on average than Region III, although the differences are minimal (lowest is 0.97). What is striking though are some regions with high value of the average index, namely: Region IV in Luzon; Region VIII in Visayas; and ARMM in Mindanao. Region IX and X have moderately higher prices on average.

Figure 9: Average regional index of dealers' prices of urea (Region III = 1.00), 2007 - 2018



Source of basic data: PSA Openstat.

One possible explanation is the fragmentation of markets at the local level. Table 6 summarizes information from PSA using data on barangays with at least one dealer in 2012, referred to as a **Dealer barangay**. The ratio of Dealer barangays per hundred rural barangays, at the provincial level, sorts the provinces into High (ratio of 1:3 or more), Medium (between 1:5 to 1:3); or Low (below 1:5). The hypothetical link is that the higher the ratio, the lower the regional price index. A simple correlation between the regional price index (mapped to provinces) and the ratio of Dealer to rural barangays is -0.36, which shows a moderate negative correlation consistent with the hypothesis. However, the link remains tenuous at best. The figures are informative about the presence of competing Dealers in the High and Medium provinces; for the Low provinces, there may be some market isolation. For instance, in Basilan, only one barangay with Dealers is available to serve farmers in 20 rural barangays. However, we cannot infer that competition is weaker in Basilan, as the Dealers in the one barangay may be in strong competition among themselves.

Table 6: Number of Dealer barangays, per hundred rural barangays, 2012

	High (33.3 and more)		Medium (20 to 33.3)		Low (below 20)	
	Province					
1	Occidental Mindoro	70.0	Bukidnon	33.2	Lanao del Norte	19.9
2	Rizal	55.0	Quirino	32.8	Guimaras	19.8
3	Bulacan	50.0	Ilocos Norte	32.3	Bohol	19.6
4	Sultan Kudarat	45.5	Apayao	31.8	Agusan del Norte	19.6
5	Nueva Ecija	45.2	Sarangani	31.5	La Union	19.2
6	South Cotabato	44.4	Mountain Province	31.0	Albay	18.6
7	Davao del Norte	41.9	Camarines Norte	30.0	Zamb. Sibugay	18.4
8	Aurora	41.5	Compostela Valley	29.4	Ilocos Sur	17.9
9	Dinagat Islands	35.1	Laguna	28.7	Zamb. del Norte	17.6
10	Tarlac	34.8	Nueva Vizcaya	28.6	Zamb. del Sur	17.4
11	Negros Occidental	34.5	Agusan del Sur	26.9	Ifugao	17.2
12	Isabela	34.3	Zambales	26.7	Sorsogon	17.1
13	Cagayan	34.0	Surigao del Sur	26.2	Surigao del Norte	17.0
14	North Cotabato	33.4	Bataan	26.1	Masbate	16.6
15			Palawan	25.8	Catanduanes	15.6
16			Camarines Sur	25.4	Abra	15.4
17			Pampanga	25.3	Batangas	15.3
18			Benguet	24.9	Kalinga	15.1
19			Negros Oriental	24.7	Romblon	14.7
20			Cebu	24.5	Cavite	14.2
21			Oriental Mindoro	24.4	Quezon	13.8
22			Lanao del Sur	23.5	Leyte	13.4
23			Davao Oriental	22.7	Marinduque	12.0
24			Capiz	22.0	Eastern Samar	12.0
25			Davao del Sur	21.6	Misamis Occidental	11.7
26			Pangasinan	21.2	Biliran	11.5
27			Maguindanao	20.1	Southern Leyte	11.2
28			Aklan	20.0	Batanes	10.7
29			Siquijor	20.0	Davao Occidental	10.5
30					Misamis Oriental	10.5
31					Antique	10.4
32					Iloilo	10.2
33					Sulu	9.2
34					Samar (Western)	8.5
35					Camiguin	7.3
36					Northern Samar	6.8
37					Tawi-tawi	5.2
38					Basilan	3.9

Source of basic data: PSA (2019).

More importantly, the correlation is probably unrelated to the price of urea, but more closely related to the size of agricultural area. In the High category are provinces with large agricultural areas, such as Nueva Ecija, South Cotabato, Davao del Norte, Negros Occidental, Isabela, Cagayan, and North Cotabato. The Medium category also includes some large agricultural provinces such as Bukidnon, Compostela Valley, and Benguet (for vegetables). The Low category mostly covers smaller provinces, or highly urbanized ones such as Batangas and Cavite, or island provinces such as Romblon, Masbate, Catanduanes, Batanes, Sulu, Tawi-Tawi, and Basilan.

Market integration

Market integration is the analytical method that attempts to systematically link price movements in related markets. Given the likely presence of nonstationarity in price time series, spatial correlations typically adopt cointegration techniques. Showing that two markets are integrated simply shows the scope or extent of a market, and thereby suggests that isolation of a market (say domestic from international; or a regional market vis-à-vis other regions) is more apparent than real. While market integration does not rule out the presence of market power, it does render it more implausible as the range of necessary coordination across players extends to all the integrated markets.

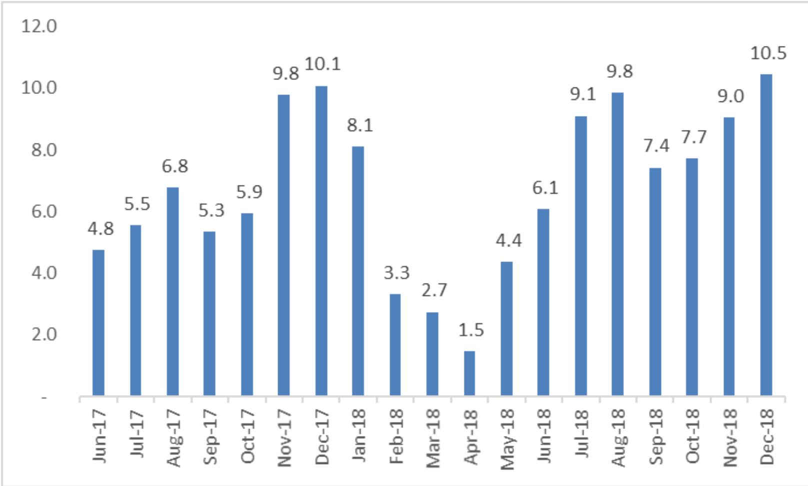
Briones (2016) showed that domestic urea prices (at the retail level) are integrated with world urea prices, based on Vector Error Correction Model. Galang (2017) extends the analysis to regional urea prices. She found that a vast majority of regional market pairs (90 percent) were integrated. Previously identified "anomalous" regions (i.e. Region IV-B, Region VIII, and ARMM) were well integrated with the regions in their respective island group (Central Philippines and Southern Philippines). Regions do not pose a meaningful segmentation of the domestic retail market; regional price differences may be due to other reasons such as high regional transport and transaction cost, that raise the marketing margin in the anomalous regions.

Retail price disparity

Retail price disparity, which compares retail prices between the Philippines and a similar neighboring country, are shown in Figure 10.[8] The discrepancies are minor, ranging from 1 to 10 percent (averaging at 7 percent). The differences may be due to cost advantage of Thailand in logistics of shipping and transport of urea; or perhaps inaccuracy in the exchange rate, as the Bank of Thailand (BOT) rates are interbank quotes and may overestimate the Php-THB rates used by international traders. We conclude that the price of urea in Philippines is generally driven by international price, as is the price of urea in Thailand. This comes as no surprise given the established market integration between the Philippines' retail prices and FOB prices of urea (Briones 2016).

[8] *Sources: Thailand Office of Agricultural Economics (link); Bank of Thailand; PSA (2019) for Philippine urea price.*

Figure 10: Retail price disparity, in percent of Thai Urea price



Asymmetric price response

Background

When barriers to entry introduce imperfect competition for imports, then changes in world price may have a biased effect on domestic price, i.e. an increase in world price is easily passed on to domestic prices, but the reverse is not true, i.e. a reduction in world price does not readily lead to a decline in domestic prices, as large importers possibly collude to earn rents by keeping domestic price elevated.

A simple check for asymmetry in vertical price transmission is proposed by Reeder (2000). Let *t* refer to a time index; dp_t denote the natural logarithm of monthly dealers' price of urea, and $deldp_t$ refer to the first difference. Next, we estimate the border price of urea, based on Black Sea price, FOB (from World Bank Pink Sheet), valued in Philippine pesos (using the monthly average exchange rate from http://econdb.pids.gov.ph/); and adjusted to CIF by the ratio of unit values of FOB to CIF from *Trademap* annual data, averaged 2000-2018. Let bp_t denote the natural logarithm of monthly border price of urea; $pos_t\,(neg_t)$ a dummy variable equal to one when current border price is higher (lower) than the previous month's border price; $jan_t, feb_t, \ldots, nov_t$ denote dummy variables for months; and ε_t an error term. The model whose parameters need to be estimated is specified in Equation (5):

$$\begin{aligned}\Delta dp_t = \gamma_0 + \gamma_1 \cdot pos_t \cdot \Delta bp_t + \gamma_2 \cdot neg \cdot \Delta bp_t + \gamma_3 \cdot t + \gamma_4 \cdot jan_t + \gamma_4 \cdot feb_t + \gamma_5 \cdot mar_t + \\ \gamma_4 \cdot apr_t + \gamma_4 \cdot may_t + \gamma_4 \cdot jun_t + \gamma_4 \cdot jul_t + \gamma_4 \cdot aug_t + \gamma_4 \cdot sep_t + \gamma_4 \cdot oct_t + \gamma_4 \cdot nov_t + \varepsilon_t\end{aligned} \quad (5)$$

Note that the lagged terms have been omitted in order to focus on contemporaneous relationship between monthly prices. In the following, statistical analysis is conducted using *Stata*.

Least squares estimates

First, we attempt to estimate the model using ordinary least squares (OLS). Results are shown in Table 7.

Table 7: Results of OLS regression for monthly urea price, 1990 - 2018

deldp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
posdelbp	.9656159	.0132668	72.78	0.000	.9395183	.9917134
negdelbp	.9793794	.0143482	68.26	0.000	.9511545	1.007604
time	.0000159	.0000103	1.55	0.121	-4.24e-06	.0000361
jan	-.0018116	.0050675	-0.36	0.721	-.0117802	.0081569
feb	.0038228	.005004	0.76	0.445	-.0060209	.0136664
mar	-.0001115	.005008	-0.02	0.982	-.0099629	.0097399
apr	.0020061	.0050189	0.40	0.690	-.0078668	.0118789
may	-.0025885	.0049984	-0.52	0.605	-.012421	.007244
jun	-.0077837	.0050209	-1.55	0.122	-.0176605	.0020931
jul	-.0048833	.0050127	-0.97	0.331	-.014744	.0049774
aug	-.0047505	.0050134	-0.95	0.344	-.0146125	.0051115
sep	-.0088414	.0050045	-1.77	0.078	-.018686	.0010033
oct	-.0034699	.0050028	-0.69	0.488	-.0133111	.0063714
nov	.0005071	.0050016	0.10	0.919	-.0093318	.0103459
_cons	-.0022602	.0040224	-0.56	0.575	-.0101728	.0056525

The F-test rejects the hypothesis that the coefficients are jointly zero; the goodness-of-fit of the model is high, giving an adjusted R^2 of 0.97. However, the Breusch-Godfrey test (with one lag) fails to reject the null of no serial (auto) correlation at high level of significance (Chi-squared of 55.1).

The presence of autocorrelation implies a violation of the assumptions of OLS, vitiating its property as being a Best Linear Unbiased Estimator (BLUE). A correction to OLS must be made to restore the BLUE property.

Application of Cochrane-Orcutt procedure

The correction in this analysis is the Cochrane–Orcutt procedure; the resulting estimates from applying the procedure are shown in Table 8. The coefficients for *posdelbp* and *negdelbp* are both close to unity and have very high t-values. The Hausmann test fails to reject equality of these coefficients, given a high F-value (Type 1 error probability of 1 percent). Hence the statistical analysis fails to find asymmetric price effects; importers are as likely to pass on reductions in world price as they are to pass on increases in world price.[9]

[9] *Another Cochrane-Orcutt corrected regression was implemented by replacing* Δbp_t *with its lagged term in Equation (3). Coefficients are smaller but are still identical at significance level 0.18.*

Table 8: Results of regression with Cochrane-Orcutt correction, monthly urea price, 1990 - 2018

deldp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
posdelbp	.9726959	.0118023	82.42	0.000	.9494791	.9959128
negdelbp	.9744334	.0132825	73.36	0.000	.9483047	1.000562
time	.0000146	.0000157	0.93	0.351	-.0000162	.0000454
jan	-.0020271	.0039575	-0.51	0.609	-.0098121	.005758
feb	.0039284	.0046454	0.85	0.398	-.0052098	.0130666
mar	-.000111	.0048609	-0.02	0.982	-.0096732	.0094511
apr	.0017744	.0049608	0.36	0.721	-.0079843	.0115331
may	-.00261	.0049786	-0.52	0.600	-.0124037	.0071837
jun	-.0080578	.0050056	-1.61	0.108	-.0179045	.0017889
jul	-.0049892	.0049897	-1.00	0.318	-.0148048	.0048264
aug	-.0047039	.0049552	-0.95	0.343	-.0144515	.0050437
sep	-.008817	.0048513	-1.82	0.070	-.0183603	.0007264
oct	-.0034799	.0045971	-0.76	0.450	-.0125231	.0055632
nov	.0004122	.0038881	0.11	0.916	-.0072364	.0080607
_cons	-.0023937	.0045536	-0.53	0.599	-.0113514	.006564
rho	.3980945					

ANALYSIS OF THE MARKETING CHAIN

Key players

Major brands

Some of the major specialized fertilizer companies are as follows:

Atlas Fertilizer Corporation (AFC) – incorporated in 1957, the AFC is the oldest operating fertilizer company in the Philippines and was first to achieve full scale manufacturing of compound fertilizers. In 2004 it was acquired by Sojitz Corporation of Japan. The AFC works closely with the DA, International Rice Research Institute (IRRI), and other R&D organizations, to promote site specific nutrient management. Its products include: Atlas Perfectgro (14-14-14); Atlas Supergro (16-20-0); and various non-traditional fertilizer grades.

Universal Harvester Inc. (UHI) – is a Filipino-owned company engaged in the manufacture, importation, and distribution of fertilizers. It initially specialized in sulphate of potash, then ventured into other fertilizer grades. UHI fertilizer plants are located in Special Economic Zones managed by Philippine Economic Zone Authority.

Philippine Phosphate Fertilizer Corporation (Philphos) – Philphos was established as a joint venture between the governments of the Philippines and Nauru in the 1980s. From 1987 onward it was operating a large fertilizer plant in Leyte. The company was subsequently privatized in 2000. Up to 2013, it was a leading supplier of phosphate fertilizers not only to the Philippines, but also to other Asian countries such as Thailand, Vietnam, Myanmar, and Nepal. However, in 2013 its factory was destroyed by Typhoon

Yolanda. In 2018 an Indian company agreed to invest in rehabilitation of the fertilizer plant.

Soiltech Agricultural Products Corporation – Soiltech produces the Swire brand, which is the leading brand for compound fertilizers in Luzon. Its products are Complete, Ammophos, and the 6-9-15 tobacco grade.

Examination of the FPA list of licensed handlers show the following: There are 278 fertilizer handlers legally licensed to operate throughout the country. Of these, 173 are licensed to import; these are usually the larger companies (it is seldom the case that small enterprises are capable of importing). The licensed importers may have, in addition to specialized fertilizer companies, the following categories:

- *Agro-enterprise company* – these are engaged in fertilizer imports, but also derive revenue from a wide variety of agri-related businesses. For instance, La Filipina Uy Gongco produces the Amigo brand, but is a diversified conglomerate engaged in sale of pesticides, feeds, and various food products. Similarly, Planter's Products is a well-known fertilizer company (at one point supplying 70 percent of the nation's fertilizers); however, it also markets pesticides and seeds. Within this category are the importer-end-users, such as Universal Leaf (a large tobacco exporter).
- *Chemical company* – these companies have fertilizers as one among many chemical products being marketed. Examples are: Chemrez Technologies (an oleochemicals company); Alyson's Chemical Enterprises markets the Siam fertilizer brand, but is also engaged in importation, distribution, wholesale, and retail of fine, industrial and mining chemicals, pharmaceuticals and reagents.

In view of these other companies, examining sales figures from company reports will fail to capture actual fertilizer sales for the industry. This is because sales figures in agro-enterprise companies and chemical companies will include sales of non-fertilizer products. Hence, the only way to isolate such sales figures will be to collect data directly from either the FPA or FIAP (see Section 2.2). However, owing to data confidentiality, neither the FPA nor FIAP have revealed company-level information on fertilizer sales, hence the four-firm concentration ratio could not be computed in this Issues Paper.

Substitution between brands

The dealers and farmer-cooperative members all mentioned *price* rather than loyalty as the primary basis for selecting a fertilizer brand. Hence, Swire is rated most popular in Luzon owing to its cheaper price; Yara and other brands are less popular because they are more expensive. Brands that are able to set competitive prices tend to dominate the immediate vicinity where their main port of entry for imported fertilizer is located; hence, Swire dominates in Luzon (it imports through Poro Point and Subic); Amigo is more popular in Visayas (as La Filipina Uy Gongco is based in Iloilo). However, once farmers select their preferred brand, they may not easily switch away from it for small differences in price compared to an alternative (i.e., Php 10 – 20 per sack). However, when the deviation is larger (say about Php 50 per sack), they are likely to shop around and switch to another brand.

Concentration in the marketing chain

It is unclear whether there is concentration at the wholesale level. The 2017 Register of Fertilizer Handlers of FPA lists numerous Distributors, with multiple Distributors in one province. The Distributors in our interviews claimed intense competition with other Distributors in the municipality or adjacent municipalities. Their market is typically the Dealers within their municipality or within adjacent municipalities.

Meanwhile a large wholesaler is the National/Area Distributor, which can market over a wider range of locations than the average Distributor. The Registry lists 32 Area Distributors, of whom half are located in a province or City with at least one other Area Distributor; the remaining half are located in a province with no other Area Distributor. Provinces or Cities with more than one Area Distributor are found in dense markets which can be the distribution point over a large area, e.g., Davao City, Iloilo City, and so on. Briones (2016) reports an interview with an Area Distributor in Ilocos Region who claimed that her market is within the province, but there are cases in which dealers source from a different Area Distributor, especially Dealers on the provincial boundary. Hence, Area Distributors also face competition from other Area Distributors, or even Distributors within a province.

Margin breakdown along the marketing chain

The following reports the findings from field interviews regarding marketing margins. In some cases, respondents were either unwilling or unable to reveal marketing costs. The latter is to be expected given their engagement in multiple product lines in agro-trading, making it difficult to associate certain costs (trucking, warehousing, utilities, personnel, etc.) solely to the marketing of fertilizers.

Importers

In Regions I and III, imported fertilizer typically enters into the Port of Subic, and Poro Point, with some amounts entering through the Port of La Union. Fertilizers arrive either in neutral (unlabeled) bags or unbagged and siphoned from the ship and then these are bagged or rebagged by subcontractors, known as Bulk handlers. Bulk handlers are paid per bag and they sometimes serve several Importers. Only Importers are known to invest in large warehouses; these are however for goods in transit from ship to distributor, with every bag turned over rapidly to avoid cost of idle capital.

Two Importers were interviewed. One is reputed to be the largest seller of fertilizer in the country; its shipments of 14-14-14 and Ammophos are about 225,000 tons per year. This importer providing some breakdown of its cost per ton for 14-14-14 as follows (in Php):

- Fertilizer (imputed, cif) 776
- Stevedoring 19
- Arrastre (+ rebagging) 40
- Net margin 70
- Selling price 905

The other Importer refused to divulge cost data. The respondent did confirm that there is strong competition even at the level of importers (where there were admittedly few players); rather than colluding, Importers are locked in heated business rivalry.

The possibility may be raised that such cut-throat competition may be a sign of predatory pricing, where a market leader (or leaders) may set a punitively low price today, and drive out competitors, only to recoup losses by raising prices later once competitors have exited. However, this strategy is viable only in the presence of significant entry barriers (Roberts, 1988). Entry barriers to trading of imported products are quite modest by the standards of medium and large agribusiness companies. Predatory pricing today may eject current competitors, but recouping becomes nearly impossible with new entrants; the strategy is unlikely to be a viable in the long run.

Distributors

For Distributors, the purchase price (from importers) ranges from Php 890 to Php 950 per bag, for an average of Php 915. Meanwhile, the selling price ranges from Php 940 to Php 995, for an average of Php 957. The gross margin per bag ranges from Php 30 to Php 50.

The Distributors (except one) provided a breakdown of the margin: Labor/handling accounts for about 12 percent of the margin, and transportation another 60 percent, leaving return to capital at 28 percent. As a percent of purchase price this is only 1.2 percent.

Table 9: Pricing and margin breakdown of Urea, Distributor level, in Php per 50 kg bag

	1	2	3	4	5	Average
Purchase price	890	945	950	920	870	926.25
Selling price	940	995	980	950	920	966.25
Gross margin	50	50	30	30	50	40.00
Gross margin breakdown:						
Labor/handling	2.00	6.00	20	5.00	30.00	4.80
Transportation	12.50	30.00	0	0.00	12.50	24.00
Miscellaneous	0.00	NA	0	0.00	0.00	NA
Operating costs	15.00	36.00	20.00	5.00	42.50	28.80
Returns to capital	5.00	14.00	10.00	25.00	7.50	11.20

Source: Author's data.

Dealers

Similar to Distributors, Dealers adopt rule-of-thumb pricing which is a fixed margin per bag, confirming the finding in Briones (2016). It is also consistent with the symmetric pricing found earlier between world price and domestic price. Fixed margin is not always successful however; sometimes they must accept a lower margin if they fail to time their acquisition of stocks properly, i.e. new and cheaper stock comes in which undercuts their price, or conversely they happen to buy their stocks at a high price. This is the main source of risk in their business. However, at other times they are able to acquire new stock at low cost, allowing them to generate higher profit; on average over a crop year the target margin is maintained.

For the same 50 kg bag of urea, purchase price (from Distributors) varies from Php 960 to Php 1040, with Php 995 as the average. Meanwhile, selling price (to farmers) varies from Php 980 to Php 1040, with the gross margin varying from Php 10 pesos to as high as Php 80, for an average gross margin of Php 30. In Table 10, the outlier is obviously Dealer No. 5; this Dealer is a cooperative, and the extra mark-up is for sale on credit, to be paid after harvest season. Nearly all customers of Dealer No. 5 are the cooperative members who purchase on credit. Hence, the net margin (Php 13.17 per bag) is italicized as this outlier margin was omitted in the computation.

For Dealers, labor and transportation takes up about 30 percent each of the gross margin, while miscellaneous items account for about 10 percent. The net margin of Php 14 per bag is only 1.3 percent of the purchase price on average. With rapid turnover, this may end up as generating an excellent return on working capital outlay, at least for a few months of the year.

Table 10: Pricing and margin breakdown of Urea, Dealer level, in Php per 50 kg bag

	1	2	3	4	5	6	Average
Purchase price	1020	960	1030	970	1040	930	995.00
Selling price	1040	980	1050	1020	1120	940	1022.50
Gross margin	20	30	20	50	80	10	35.00
Gross margin breakdown							
Labor	NA	NA	6.50	6.50	8.1	7.00	7.03
Transportation	NA	NA	7.00	6.50	0.00	0.00	3.38
Miscellaneous	NA	NA	0.00	7.00	10.71	0.00	4.43
Operating costs	NA	NA	0.00	20.00	18.81	7.00	11.45
Returns to capital	NA	NA	6.50	30.00	61.19	3.00	*13.17*

Source: Author's data.

Policy and regulatory environment

Domestic policies

According to the FPA, the substantive issues raised on their regulatory service are: i) persistent industry malpractice of underweight bags; ii) long processing time for testing and licensing; and iii) imposition of new testing and safety standards.

The problem of i) underweight bags continues but is still uncommon. Usually, this occurs when bulk handlers further subcontract baggers; sometimes in their haste to bag, errors occur in the form of underweight bags.

For ii), the FPA is taking steps to address this and adopt streamlining of the licensing process, in compliance with the Ease of Doing Business Act (RA 11032). The FPA has also acquired ISO certification. Based on the FPA Citizen's Charter, the longest maximum processing time is 28 days for Product Registration (owing to mandatory testing); the shortest is VAT Exemption and other certificates (4 days). Informants claim that the FPA is compliant with these processing times. Note though that other causes of long processing are the preliminary requirements. For instance, for product registration, the preliminary requirements include:

- Photocopy of the approved Experimental Use Permit (EUP)
- Second Endorsement of bioefficacy data from FPA Regional or Provincial Officer 7
- One (1) bioefficacy data

EUP requires 12 days to process. The bioefficacy test must be administered by an FPA accredited testing company. The bioefficacy data must first be endorsed by a Provincial or Regional Officer of the FPA. Respondents report no problem in accessing testing facilities (as these are usually large importers, manufacturers, or national distributors). However, the processing time is perceived by industry players as too long, owing to compliance with these preliminary requirements, on top of the 28 days Central Office processing.

For iii), the FPA concedes that every new requirement encounters resistance from the industry; however, these standards are being aligned with international standards with the goal of easing the flow of imported fertilizers into the market. The industry is adequately consulted through a Fertilizer and Pesticide Technical Advisory Committee which includes members of the industry and the scientific community. Interviews with industry players uncover no serious inconsistencies with this general impression.

From the side of the farmers meanwhile, the main clamor from this constituency is restoration of input subsidy. However, Briones (2016) has argued that the VAT exemption provides more than enough implicit subsidy for the product.

Table 11: Processing time for FPA requirements, in working days

Requirement	Processing time
Certificate of Product Registration (New; Renewal; Traditional; Non-traditional)	28
Fertilizer Experimental Use Permit	12
Registration as Fertilizer Handler	7
Registration as Fertilizer Dealer	6
VAT exemption certificate; Export Certificate; Other Certificate	4

Trade policy

The industry players mentioned no major issues in trade policy within the fertilizer industry itself. Imports can be brought in freely as long as the trader has the appropriate license and has registered the product being imported. No quantitative or pricing restrictions are being imposed.

What is being cited as an issue is trade policy in the palay sector, the largest source of demand for fertilizer in the regions investigated. Distributors and Dealers raised serious concerns about the liberalization of rice imports under the Rice Tariffication Law. Their concern is that palay production will decline dramatically owing to the influx of cheap imports. This may have negative repercussions upstream in the agri-chemical industry. Note however that if Briones (2018) and others are correct, medium to long term outlook for agri-chemicals (including fertilizers) remains robust, contrary to a prevailing pessimism that seems transfixed on short-term adverse impacts of the inevitable import shock.

Concluding remarks

To summarize: domestic and trade policies and regulations pose no significant barriers to entry, nor serve to favor dominant players. The key barrier to entry to small players is the ability to mobilize large amounts of working capital and achieve high volume of sales so as to earn enough despite low margins. However, the fact that margins are low are due to robust competition at the wholesale and retail level.

Hence, the only recommendations to be made are as follows:

- Introduce at least monthly monitoring of wholesale price data (at the Distributor level) to obtain a fuller picture of price movement along the value chain, and allow calculation of nominal protection rates;
- Continue to implement the open trade regime and market-based pricing of fertilizer (though with on-going VAT exemption); and
- Continue the process of streamlining of licensing, product testing, and registration, to reduce the cost of doing business for all players.

REFERENCES

Briones, R. 2016a. The Fertilizer Industry and Philippine Agriculture: Policies, Problems, and Priorities. Philippine Journal of Development 43(1b).

Briones, R. 2016b. Inadequate N Application of Rice Farmers in the Philippines: Problems, Causes, Solutions. Discussion Paper Series No. 2016-01. Quezon City: PIDS.

Briones, R. 2018. Scenarios for the Philippine Agri-Food System with and without Tariffication: Application of a CGE model with Endogenous Area Allocation. Discussion Paper Series No. 2018-51. Quezon City: PIDS.

Campillo, Carlos & Fortes, Rafael & Prieto, Maria. (2012). Solar Radiation Effect on Crop Production. 10.5772/34796.

Fertilizer and Pesticide Authority. (2013). Fertilizer Regulatory Policies and Implementing Guidelines. Fertilizer Regulatory Division, FPA, Quezon City.

Galang, IMR. (2017). A Spatial Integration Analysis of the Regional Urea Fertilizer Markets in The Philippines. Philippine Journal of Development 44(1): 1-20.

Hernandez, Manuel; and Torero, Maximo. 2013 Market concentration and pricing behavior in the fertilizer industry: A global approach. Agricultural Economics 44(6): 723-734.

Medalla, E., et al. 2018. Competition in Philippine Markets: A Scoping Study of the Manufacturing Sector. Quezon City: PCC.

Manalili, R., C. Launio, J. Beltran, A. Litonjua, A. Mataia, F. Bordey, I. Tanzo, and P. Moya. 2016. Fertilizer and nutrient management. In: Bordey, F., P. Moya, J. Beltran, and D. Dawe, eds. Competitiveness of Philippine Rice in Asia.

Milgrom, P. 1988. Predatory pricing. The New Palgrave: A Dictionary of Economic Theory and Doctrine. J. Eatwell, M. Milgate, and P. Newman, eds. London: MacMillan Press.

Moya, P., and D. Dawe. 2007. Mechanization and saving labor are the keys to making rice more competitive. In: Dawe, D., P. Moya, and C. Casiwan, eds. *Why does the Philippines Import Rice? Meeting the challenge of Trade Liberalization*. Los Baños, Laguna: IRRI and PhilRice.

Praba, M.L., M. Vanangamudi, and V. Thandapani. 2004. Effects of low light on yield and physiological attributes of rice. International Rice Research Notes 29(2): 71-72.

Reeder, M., 2000. Asymmetric prices: implications on trader's market power in the Philippine rice. Journal of Philippine Development 27 (1): 49-69.

Witt, C., R. Buresh, S. Peng, V. Balasubramanian, and A. Dobermann. 2007. Nutrient management. In: Fairhurst, T., C. Witt, R. Buresh, and A. Dobermann, eds. Rice: A Practical Guide to Nutrient Management (2nd ed.) IRRI, International Plant Nutrition Institute, and International Potash Institute.

PHILIPPINE COMPETITION COMMISSION

Ensuring businesses compete and consumers benefit

Contact Us

The Philippine Competition Commission is open Mondays through Fridays, from 8:00 a.m. to 5:00 p.m. Submissions of notifications and complaints are accepted during these hours.

25/F Vertis North Corporate Center 1, North Avenue, Quezon City 1105 Philippines

www.phcc.gov.ph

+632.8771.9722

queries@phcc.gov.ph

PHILIPPINE • COMPETITION COMMISSION