DEVELOPING PHILIPPINE AGRICULTURE THROUGH AGRIBUSINESS

ISSUE NO. 4 | SERIES OF 2018

LABOR MARKET INTELLIGENCE REPORT

Technical Education and Skills Development Authority

December 2018

Table of Contents

Developing Philippine Agriculture through Agribusiness

I. Background

The United Nations Development Programme (UNDP) once claimed that the Philippines is one of the few "mega biodiversities" left in the world, showcasing a huge variety of animal and plant life rarely seen elsewhere. Such an abundance of resources normally implies a great amount of wealth for any country; indeed, an Israeli agriculturist once said that the country has enough fertile farmland and fisheries to potentially feed the whole world, if given the chance.

As such, it is quite ironic to know that despite having a supposedly-strong agricultural industry, the country's farmers and fishers are among its poorest citizens. In fact, the Philippines remains to be one of the world's largest importers of rice, milk, beef, and other produce- a far cry to the praises mentioned above. Moreover, the country once provided technical assistance to Ecuador and Thailand in improving their production of abaca and coconut (respectively). But after several years, these countries would trump the Philippines in the production of the same products, becoming leaders in their respective sectors.

Several factors went into play that led to the rather lackluster state of Philippine Agriculture at present. Among the biggest is the lack of farm to market infrastructure (such as roads) that would significantly reduce production and distribution costs, and thus save farmers and fisherfolk some capital. In 2013, it was reported that the country lacks some 13,000 km of farm-to-market roads, which remained largely unchanged in 2017. The outcome is clear: poverty continues to grip the Agriculture Sector, resulting in food shortages and even more poverty. In order to turn things around, the country must strive to develop its Agriculture Sector and achieve some level of self-sustainability. Many solutions have been presented in the past and among them is agri-business.

This Labor Market Industry Report is intended to explore the potential of agri-business in improving the country's Agriculture Sector, with the help of technical vocational education and training (TVET). It will also explore possible avenues and interventions that TESDA can utilize in this regard, given that a number of its course offerings and TVET programs are centered on agriculture.

II. Philippine Agriculture and Agribusiness

Once heralded as one of the biggest contributors to the Philippine economy, the Agriculture and Fishing Sector's economic performance now leaves a lot to be desired, despite its potential. To begin with, during the fourth quarter of 2017, the Agriculture Sector is said to have contributed only 0.3% to the Philippine GDP. This is quite low when compared to the Services (3.9%) and the Industry Sectors (2.5%). This low performance is somehow offset when it is taken into account with the other quarters, which amounted to an 8.49% contribution to the country's GDP for that year.

There is no denying that the country's Agriculture Sector still needs to do better in assailing its traditional problems, such as poor irrigation to extreme climate, to political problems, have led to this predicament, all of which resulting in the country's crops losing out on competitiveness in the global market. On the market-side of things, the Sector is plagued with poor logistics, bad farmer credit, inadequate crop insurance, and rather lackluster extension services. This is why in the 10-point Socio-Economic Agenda of the Duterte Administration, infrastructural and financial support are among the key strategies recommended to support the country's farmers.

That being said, the production of crops has steadily grown over the past few years as indicated by the Philippine Statistics Authority (PSA). Rice production reached 19.2 million metric tons in 2017, upwards from 18.4 million in 2013. Sugar remained to be the largest crop produced by the country, amounting to 29.2 million metric tons compared to 24.6 million in 2013. Even then, there's still a call to prioritize the export of so-called high-value winner crops such as avocado, banana, coffee, mango, cacao, and pineapple. This is to make the country more competitive especially when compared with other countries that perform well in agricultural exports such as Vietnam.

Overall, the country's crop production reached 91.5 million metric tons in 2017, which is in itself a major improvement over the 81.6 million in 2016 and the 85.7 million in 2013[4]. Refer to Table 1 for more details.

Table 1. Production Volume of Philippine Crops, 2013 - 2017

ITEM	2013	2014	2015	2016	2017
			('000 mt)		
TOTAL	**85,739.4**	**87,007.9**	**84,324.6**	**81,631.9**	**91,552.5**
Palay	18,439.4	18,967.8	18,149.8	17,627.2	19,276.3
Corn	7,377.3	7,770.6	7,518.8	7,218.8	7,914.9
Coconut	15,354.3	14,696.3	14,735.2	13,825.1	14,049.1
Sugarcane	24,584.8	25,029.9	22,926.4	22,370.5	29,286.9
Banana	8,646.4	8,884.9	9,083.9	8,903.7	9,166.3
Pineapple	2,458.5	2,507.1	2,582.7	2,612.5	2,671.7
Coffee	78.6	75.5	72.3	68.8	62.1
Mango	816.4	885.0	902.7	814.1	737.0
Tobacco	53.8	61.4	56.2	56.5	51.0
Abaca	65.0	68.1	70.4	71.8	68.8
Peanut	29.1	29.2	29.2	27.9	29.4
Mongo	32.4	32.1	33.6	34.0	35.3
Cassava	2,361.6	2,540.3	2,714.3	2,755.1	2,806.7
Sweet Potato	528.2	519.9	536.0	529.5	537.3
Tomato	207.7	214.6	214.8	210.7	218.8
Garlic	9.0	9.0	10.4	7.5	7.8
Onion	134.2	203.7	181.2	122.6	184.4
Cabbage	127.5	128.0	125.8	123.1	122.5
Eggplant	219.9	225.6	232.9	235.6	241.9
Calamansi	164.1	160.7	162.7	118.2	116.7
Rubber	444.8	453.1	398.1	362.6	407.0
Others	3,606.4	3,545.3	3,587.1	3,535.9	3,560.5

Source: PSA

Livestock also saw a slow, but steady kind of growth at about 1.12% in 2017. Individually, hog and dairy production saw the most gains, reporting growths of around 1.49% and 7.56% respectively. As for poultry, chicken production reached 4.62%, which is higher than the 1.39% reported last year. All in all, the Livestock subsector in Agriculture was able to reach some PHP 251 billion in production value, while Poultry netted PHP 215 billion in terms of production. Refer to Table 2 for more information.

Table 2. Production Volume of Philippine Livestock and Poultry, 2013 - 2017

ITEM	2013	2014	2015	2016	2017
			('000 mt)		
LIVESTOCK (liveweight)	**2,507.0**	**2,532.5**	**2,627.1**	**2,745.4**	**2,775.8**
Carabao	141.5	143.0	142.0	144.7	144.4
Cattle	258.5	261.3	266.9	270.4	266.3
Hog	2,012.2	2,032.3	2,120.3	2,231.7	2,265.0
Goat	75.4	76.1	77.5	77.5	77.3
Dairy	19.5	19.7	20.4	21.2	22.8
POULTRY (liveweight)	**1,589.5**	**1,606.4**	**1,694.8**	**1,706.7**	**1,777.0**
Chicken	1,555.1	1,571.8	1,660.8	1,674.5	1,745.9
Duck	34.5	34.6	33.9	32.2	31.1
Egg	**468.8**	**457.2**	**487.0**	**505.9**	**537.8**
Chicken	427.7	415.7	444.6	461.7	492.4
Duck	41.1	41.5	42.4	44.2	45.4

Source: PSA

Unfortunately, the Fishing subsector's decline continued in 2017, dropping from 1.16% in 2013 to -1.67% in terms of production.

In terms of manpower, Agriculture employed approximately 11.06 million Filipinos in 2016, equivalent to about 27% of the total workforce in the country, which is slightly lower than the 29% (11.26 million) recorded from 2015 and the 32% in 2012. The government has attempted to alleviate the shrinking manpower by increasing Sector-related expenditures from PHP 114.46 billion in 2015 to PHP 122.23 billion in 2016, or 22.49% higher than the previous year. According to SEARCA, the average age of Filipino farmers is 57 years, hinting at the large deficit of young workers in this Sector.

Unfortunately for the Philippines, youths have not shown a keen interest in Agriculture as a whole, viewing it is a subsistence livelihood. The key here, however, is that the youth should not see farming as an activity they will do on their own, but rather as a profession they can take up as part of an organization or business. In the experience of the Department of Agrarian Reform (DAR), farmer businesses gain the most profit as opposed to individual farmers and small communes, since their social capital easily translates to financial capital that allow banks to work with them favorably.

The City Government of Davao have achieved some success in this regard, as evidenced by their "Agribeshies: The Agribiz Youth Club of Davao" program that they conducted in early 2018. The program engaged technical training centers-turned farm schools, as well as existing farms, to create a new generation of entrepreneurs who specialize in organic agriculture. The program is also envisioned to expose school-based agribusiness students to hands-on farming practices and business practices. All of this is done with the express purpose of turning agribusiness in one of Davao City's premier strategies in making the youth more productive, a sentiment that is no doubt shared in the rest of the country.

Bayan Academy defines agribusiness as "…the commercial aspect related to agriculture or agricultural activities and its products". Unlike agriculture in the traditional sense, agribusiness covers a variety of fields ranging from input production and operations management, to trading and retailing. This subsector offers a lot of potential for budding entrepreneurs, thanks to international trade. Additionally, President Rodrigo Roa Duterte's approval of the Inclusive Business platform makes investments even more lucrative, given the income tax holidays (up to five years) that can be granted to those awarded Pioneer Status under the 2017-2019 Investment Priorities Plan.

In 2014, the country's agricultural exports value netted more than USD 6 billion, a significant leap from USD 2.6 billion in 2005. This is one of the major motivations in the 2017-2022 Philippine Development Plan to expand the Agriculture Sector by adding more economic opportunities for both major farm organizations and smaller farmers and fisherfolk. The Plan's medium term goals is to have the

entire Sector transition from a subsistence form of livelihood to an agribusiness type that take advantage of emerging high value crops.

III. Potential Areas in Agribusiness

The present Administration's 10-Point Socio-Economic Agenda, made it clear that agribusiness is the way forward to improve the Agriculture Sector. Specifically, the Agenda seeks to "promote rural and value chain development towards increasing agricultural and rural enterprise productivity and rural tourism" and to "ensure the security of land tenure to encourage investments, and address bottlenecks in land management and titling agencies." More than 12 million Filipinos, or about one-third of the country's total workforce, are engaged in the Sector, so there shouldn't be any shortages of manpower for an agribusiness venture to thrive[6].

The success of agribusiness primarily hinges on the choice of produce that savvy entrepreneurs wish to engage in. By taking into account the 2018 Agriculture Statistics created by the PSA, it can be surmised that the most valuable crops in the Philippines are sugarcane, rice, and coconut. However, other crops are also quite valuable: bananas made up the country's fourth largest produce in 2017, at least in terms of production[4]. Livestock, specifically hog and dairy, and poultry, specifically chicken, also seem to be lucrative choices considering the high levels of production they saw in 2017[4].

For this part of the LMIR, the focus will be on bananas, coconut, and pork.

A) Bananas

In a guide published by the Department of Agriculture dubbed "Philippine Agribusiness Opportunities", bananas were seen with having the most opportunities for agribusiness, being a suitable food source on its own as well as a viable ingredient for chips, ketchup, flour, and pastries.

First and foremost, agribusiness entrepreneurs may opt to invest in bananas by selling them as is. Allocating one hectare of land for growing these fruits is relatively cheap, costing only an estimated PHP 156,700 with a 92% return on investment and an economic life of about five (5) years. Government support can come in the form of technical trainings, market linkages, incentives, credit provisions, site identifications, and the facilitation of business licenses.

On the other hand, bananas may be sold as chips or as a wine, which are both lucrative in the local and export markets. Investment costs are much lower than growing and harvesting the bananas themselves, at PHP 5,848 and PHP 8,995 respectively. Both of these products may be undertaken by

homebrew agribusinesses[12]. Please refer to Figures 1 and 2 for a detailed overview of banana chip and banana wine production.

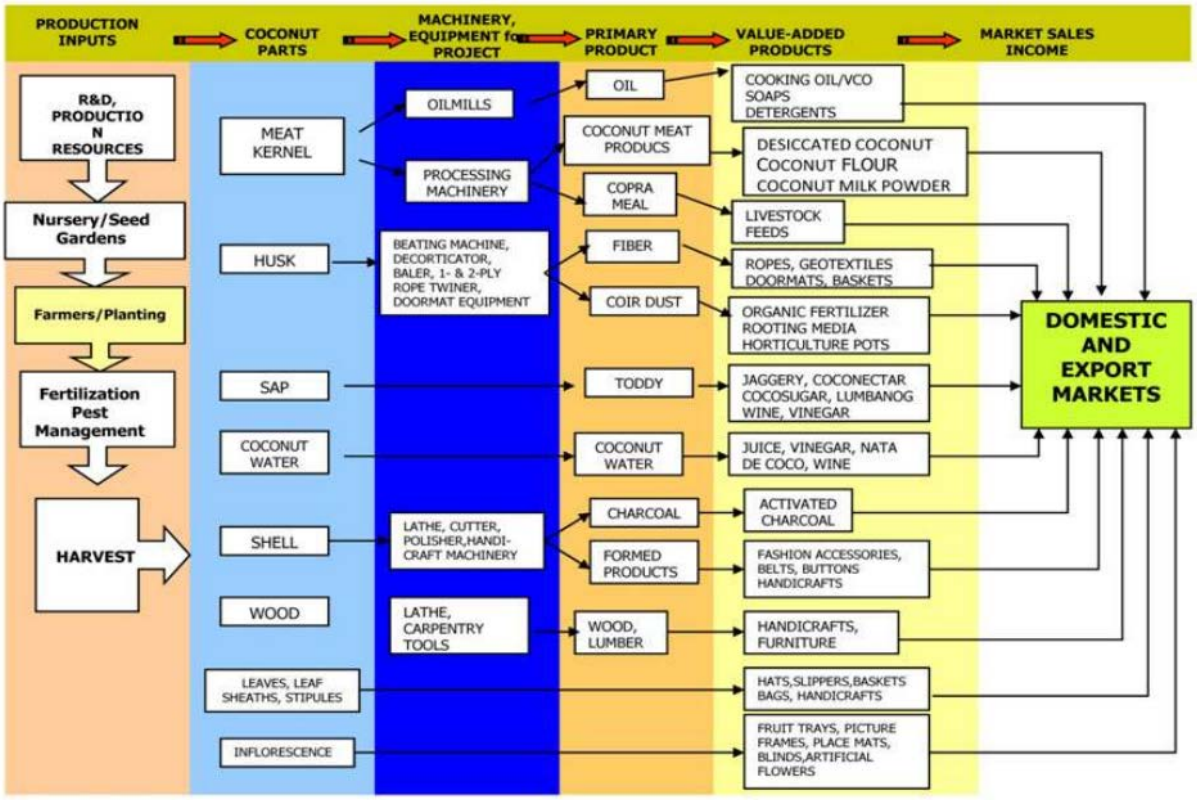
The DA also said that the following regions in the country are most suited for this type of agribusiness venture:

- Region IV-A
- Region IV-B
- Region VI
- Region VII
- Region VIII
- Region X
- Region XI
- Region XII
- ARMM
- CARAGA

B) *Coconut*

The Philippines is one of the world's major producers of coconut products, and coconut is the country's third most-produced crop in 2017. As a business venture, coconut has the advantage of versatility, given that nearly every part of the plant, particularly its fruit, can be utilized for business purposes. Figure 3, derived from data by the Asia and Pacific Community, illustrates this better.

Figure 3. Coconut Supply-Value Chain



Among these products, the most profitable is 'virgin coconut oil' (VCO), which can be used as a food supplement, body oil, cosmetic, or a personal care/hygiene product. VCO can go from USD 3,500 to USD 4,600 per ton, with major export destinations include the US, Canada, Germany, Finland, and Turkey.

The processes for creating VCO are relatively simple and can be undertaken by small and medium-scale enterprises. First is the 'dry process' that entails drying grinded coconut meat, extracting the oil, and then pulverizing the residue, which can in turn be used as a form of wheat substitute. The dry process has a high oil recovery rate of about 88% assuming that the coconut meat has a high oil content. The other process is called the 'wet process' that involves extracting the oil using milk, then drying and grinding the residue to produce flour. This method has a 52% extraction rate, but it results in a type of flour that has a high fiber content.

Table 4. List of Equipment for the Production of VCO and Coconut Flour, for Operations Working on 500 Nuts/Day Capacity

Equipment	**Unit**	**Cost (Est., in PHP)**
Grinder/Pulverizer	1	45,000
Spinner	1	45,000
Dryer	1	190,000
Expeller	1	120,000
Grater	1	7,000
Building		
Land (100 sq m)	500 / sq m	50,000
Building (60 sq m)	2,500 / sq m	150,000

Another coconut product that can be viable for agribusiness entrepreneurs is coconut water, which the Philippines was able to export USD 15 billion-worth of it worldwide in 2011. Part of its appeal is its many health benefits such as organic vitamins and minerals, appropriate potassium content to help regulate blood pressure, and its de-aging properties. Coconut water can be extracted by hand or with the use of a sophisticated system of sanitizing containers and cooling tanks.

C) Pork

Pork benefits from a wide-range of product possibilities: *embutido*, sausages, and hamburgers, just to name a few. To illustrate, *embutido* production can only cost about PHP 328 in investment, and will yield a net profit of about PHP 65 from a retail price of PHP 263. Refer to Figure 4 for a more detailed look on this product. The small-scale nature of production can prove enticing to budding agribusiness entrepreneurs, but investing

more in farm technologies and practices may yield greater results, which can be enough to encourage hog and swine raisers to engage as well.

Several institutions, such as the Philippine Carabao Center and the Bureau of Animal Industry, have developed gene marker technology to screen genetic defects in pigs, as well as to increase litter sizes and meat quality. The aim of this technology is to improve efficiency and productivity by regulating the number of pigs weaned every year, as well as to create a favorable live-weight ratio of production.

Other institutions, such as the Central Luzon State University, have developed a set of loop-mediated isothermal amplification (LAMP) protocols to treat respiratory and gastrointestinal diseases common to pigs. The DA has sought to institutionalize this system, in addition to establishing a pilot laboratory for the production of LAMP test kits for the benefit of pig farms in the region.

IV. TESDA and Agribusiness

In support of the Agriculture and Fisheries Sector, TESDA also provides training and scholarship programs in conjunction with various other agencies. One of which is the Program on Accelerating Farm School Establishment (PAFSE) with the Departments of Agriculture and of Agrarian Reform, which seeks to establish farm schools throughout the country, as well as to provide farm scholarships to farmers and fisherfolk. Through PAFSE, TESDA regional and provincial offices are obliged to provide technical assistance and program accreditation, which include actual site inspections, to farm establishments that seek to provide training. Aside from PAFSE, TESDA also provides entrepreneurship trainings with the Department of Trade and Industry (DTI) through the "Skills Training for Employment/Entrepreneurship Program (STEEP)".

The TESDA Board has also found it earnest to pursue a "relevant, efficient and effective entrepreneurship education". Through Board Resolution No. 2017-03, the TESDA Board has approved and promulgated "the policy on the institutionalization of entrepreneurship in TVET related programs" by declaring "that TESDA shall continue to pursue, implement and sustain Entrepreneurship development in order to enhance the productive capacity and employability of TVET graduates" and "a working group/special committee shall be created to "review, consolidate, integrate and harmonize existing, as well as develop new entrepreneurship training programs".

Programs such as these ensure that TESDA has uplifted the lives of farmers and fishers in the country through scholarships and capacity building, the latter of which lead to additional farm or fishing output. In January 2018, TESDA opened the first accredited organic farm schools in Benguet Province where 150 students were trained in organic farming practices through the agency's PHP 500 million Training for Work Scholarship Program (TWSP).

V. Skills Needs

Data from the Department of Labor and Employment's Jobsfit 2020 have revealed that the following occupations will see some growth in employment at least until 2022:

Occupation	Employment Projection	
	Number (In Thousands)	Growth Rate
Growing of perennial crops	626	3.6
Growing of non-perennial crops	467	3.2
Plant propagation, agricultural, forestry and fishing support services, and hunting and trapping	405	2.5
Fishing and aquaculture	303	2.2
Animal production	31	0.8
Processing and preserving of fruits and vegetables & manufacture of vegetable and animal oils and fats	23	0.5

There is also the growing trend of organic farming in the Philippines that do not necessarily require the use of more advanced farming techniques. In 2012, the DA allotted approximately PHP 1 billion to promote organic agriculture programs throughout the country, with the aim of encouraging farming communities to adopt practices that enrich soil fertility, reduce soil pollution, and improve overall farm output without compromising farmer and consumer health (i.e. not relying on chemical fertilizers)[10]. Similarly, agri-tourism is surging in the country as it offers rural areas another avenue towards economic development. Coffee plantations, pineapple farms, and the like can become tourist attractions, supplemented by annual events such as fiestas, farmers' field days, and agricultural fairs. These entail expertise in advertising and marketing, in addition to standard Sector-related competencies that involve maintaining and managing farm operations. It is expected that the Gross Value Added of the country's Tourism industry as a whole will reach PHP 4.7 trillion by 2022, which incentivizes farmers and fisherfolk to take part as well[10].

TESDA has already taken steps to identify the skills needs for these kinds of occupations, each of which can easily be translated to agribusiness investments. Between June 2017 and March 2018, TESDA conducted a nationwide Industry Skills Needs Assessment of Agro-Industries, covering nine (09) regions: II, IV-A, VI, VII, VIII, IX, X, XI, and XII. This Assessment was aimed at identifying priority skills by those entities engaged in agro-businesses, and thus be taken into consideration for TESDA's future programs.

Some 83 qualifications with training regulations (WTRs) were identified by the respondents. Curiously, the one that topped the list is Shielded Metal Arc Welding (SMAW) NC II, which had 13.3% response, followed by Agricultural Crops Production NC II (12%) then Aquaculture NC II and Electrical Installation and Maintenance NC II (9.6%). This goes to show that agro-businesses are in need of workers who possess the right competencies that are not directly related to the Agriculture and Fisheries Sector.

Table 5. Top WTR Qualifications as Identified by Agro-Industries

Rank	WTR Qualifications	Respondents
1	SMAW NC II	11
2	Agriculture Crops Production NC II	10
3	Aquaculture NC II	8
	Electrical Installation and Maintenance NC II	8
4	Instrumentation and Control Servicing	3
	Heavy Equipment Operation NC II	3
5	Agricultural Crops Production NC I	2
	Animal Production NC II	2
	Automotive Servicing NC II	2
	Chemical Process Operations NC III	2
	Machining NC II	2
	Mechatronics Servicing NC II	2
	Organic Agricultural Production NC II	2
	Refrigeration and Air Conditioning (RAC) Servicing NC II	2
	Trainers Methodology I	2

In addition to these WTRs, some 25 qualifications without training regulations (NTRs) were also identified by agro-industries. Again, majority of these qualifications are not directly related to the Agriculture and Fisheries Sector, with Plant Operations and Leadership/Organizational Management being the top, followed by Product Packaging.

Table 6. Top NTR Qualifications as Identified by Agro-Industries

Rank	NTR Qualifications	Respondents
1	Plant Operations	3
	Leadership / Organizational Management	3
2	Product Packaging	2
	Ricemill Operation	1
	Product Upgrading Enhancement	1
	Refresher Seminar on Leadership	1
	Tunnel Farming Technology	1
	Shelling Machine Operations	1
	Parer Operations	1
	Milling and Blending Operator	1

3	Mechanical Technician	1
	Electricians / Mechanic / Electronics Operations	1
	Corrugating Machine Operation	1
	Heavy Equipment Troubleshooting (Mechanical and Electronic)	1
	Boiler / Filtering Operations	1
	Steam Generation Operation	1
	Lathe Machine Operations	1
	Use of PLCs in operating new machine shop equipment	1

The Assessment has shown that TVET centers do not necessarily have to specialize in Agriculture or Fisheries-related courses in order to provide the Sector with the skills that it needs. See Annex D for a list of agro-industry positions vis-à-vis their equivalent TVET qualification(s).

VI. Demand-Supply

As of June 2018, TESDA has about 31 training regulations (TRs) that focus on Agriculture, Forestry, and Fishery (See Annex A for a complete list). Among these is Agroentrepreneurship that is offered in NCs II, III, and IV, all of which are focused on establishing farm operations, managing farm finances, improving worker efficiency, and the like. More specific examples dabble with poultry or swine (Animal Production), rubber (Rubber Processing, Rubber Production), and fishing operations (Fish Capture, Fishport/Wharf Operations). These TRs are currently found in about 780 training programs nationwide, and the majority of (24%) which are offered in Region X.

In 2014, there had been 51,279 enrollees to these programs, with some 41,885 graduates, plus 27,568 assessed and 25,217 certified students. These numbers have risen ever since by as much as 93% (for assessed students). As of September 2018, enrollees and graduates reached about 59,230 and 53,420 respectively, with about 53,418 assessed students and 49,850 certified ones. Majority of those enrolled come from Region VIII (9,974) followed by Region I (8,198). Refer to Annex B for a more complete breakdown of this data, comparing stats from 2017 and September 2018. In 2017, it is also revealed that Organic Agriculture Production NC II is the most sought-after Sector-related qualification, garnering almost 14,000 enrollees. See Annex C for more details.

VII. Way Forward

Judging by this year's Agriculture-related data, the top produce for potentially lucrative agribusiness ventures are bananas, coconut, and pork (excluding the country's main produce of rice and sugar). For TESDA to support the Agribusiness Subsector, it will therefore make sense to support TRs, competency standards and training programs, that are directly relevant to the production, manufacturing, and marketing of these produce. In addition, as evidenced by the Skills Needs Assessment conducted by TESDA, there are TRs sought after in the Agribusiness Subsector that are not directly related to Agriculture, but are relevant to the subsector's growth and development, which shows the relevance of other sectors and their corresponding related qualifications, such as SMAW NC II, Electrical Installation and Maintenance NC II, Plant Operations, and Leadership and Organizational Management.

Thus, TESDA should consider the following:

1) TESDA should continue to pursue relevant, efficient and effective entrepreneurship education in the Agribusiness sector. It should also explore the possibility of customizing organizational leadership and business-related courses with agribusiness in mind, seeing that they are some of the most common qualifications sought after by agro-industries.
2) Through programs like PAFSE, TESDA should prioritize providing scholarships and support to those farm schools that readily provide the said qualifications identified by agro-industries.
3) TESDA should re-focus the delivery of its Agriculture-related qualifications and make them in-line with the country's top-valued crops in terms of production output (i.e. rice, sugar, coconut, bananas, etc.)
4) TESDA should review other TRs that may be adapted to the Agriculture Sector, particularly to the Agribusiness Subsector.
5) Provide additional skills training programs that will improve the development of the sector, especially ones that will relate to providing upgrade/value-add of revenues.

References:

Amponin, L. (2018). Industry Skills Needs Assessment of Agro-Industries. Presented January 16, 2018.

The Arangkada Philippines Project (2017). *The 10-Point Socio-Economic Agenda of the Duterte Administration*. Makati City.

Argarin, Y. (2017). *Agri needs farm-to-market roads*. Manila Standard. Retrieved from: http://www.manilastandard.net/spotlight/for-faster-economic-growth-build-build-build/248883/agri-needs-farm-to-market-roads.html

Department of Agrarian Reform. (2013). *To Win Back Youth To Farming, Show 'em There's Cash In Agriculture*. Retrieved from: http://www.dar.gov.ph/national-news/1043-to-win-back-youth-to-farming-show-em-there-s-cash-in-agriculture-dar

Department of Agriculture (2012). *Philippine Agribusiness Investment Opportunities*. Retrieved from: https://www.dole.gov.ph/files/Philippine%20Agribusiness%20Investment%20Opportunities%20by%20Department%20of%20Agriculture%20.pdf

Department of Agriculture. (n.d.). *Production of Coconut Flour and Virgin Coconut Oil*. Retrieved from: http://www.pca.da.gov.ph/pdf/techno/flour_vco.pdf

Department of Agriculture. (2018). *First Three Organic Agriculture Farm Schools Open in Cordillera*. Retrieved from: http://organic.da.gov.ph/index.php/2016-12-02-08-01-40/2016-12-02-08-02-36/cordillera-administrative-region/141-first-three-organic-agriculture-farm-schools-open-in-cordillera

Duke University - Center on Globalization, Governance & Competitiveness (2017). *The Philippines: Upgrading in Agribusiness Global Value Chains*. Retrieved from: http://industry.gov.ph/wp-content/uploads/2017/08/The-Philippine-in-Agribusiness-Global-Value-Chains_An-Introduction.pdf

Food and Agricultural Organization (n.d.). *Coconut Water Processing*. Retrieved from: http://www.fao.org/docrep/pdf/010/a1418e/a1418e.pdf

Morato Jr., E. A. (2018). *A Compendium of Works on Philippine Employment Trends and Eight Policy Industries*. Bayan Academy. Quezon City.

Philippine Statistics Authority (2017). *Selected Statistics on Agriculture 2017*. Retrieved from: https://psa.gov.ph/sites/default/files/SSA2017%20%281%29.pdf

Philippine Statistics Authority (2018). *Selected Statistics on Agriculture 2018*. Retrieved from:

https://psa.gov.ph/sites/default/files/Selected%20Statistics%20on%20Agriculture%202018.pdf

Piñol, E. (2016). *Philippine Agriculture: Today and the Future*. Retrieved from: http://oldweb.da.gov.ph/images/PDFFiles/otherspdf/2016/jul14_2016/The_Philippine_Agriculture_Today_and_the_Future.pdf

Prado, J. P. (2018). *Enticing the youth to engage in agriculture*. SunStar Davao. Retrieved from: https://www.sunstar.com.ph/article/1741878

Rodriguez, F. (2014). *PH agriculture: Why is it important?* Rappler. Retrieved from: https://www.rappler.com/move-ph/issues/hunger/52372-agriculture-hunger-food-security

Southeast Asian Regional Center for Graduate Study and Research in Agriculture (2014). *Attracting the Youth to Agriculture*. [Flyer]

TESDA Circular No. 56, s. 2016. *Implementing Guidelines on Provision of Special Technical Assistance for Program on Accelerating Farm School Establishment* (PAFSE). Issued on November 07, 2016

TESDA Memorandum dated May 21, 2018. *Results of the Skills Needs Survey Agro-Industries*

Yap, J. (2017). *New Opportunities for the Philippine Swine Industry*. Agriculture Monthly. Retrieved from: http://agriculture.com.ph/2017/11/21/new-opportunities-for-the-philippine-swine-industry/

Annex A

List of Promulgated Training Regulations for Agriculture, Forestry, and Fishery (as of June 2018)

No.	Qualification Title	Qualification Code	Nominal Duration	Board Resolution #	Date Promulgated	Date Published
1	Grains Production NC II	AFFGRP215	423	2015-25	12/16/15	12/27-28/15
2	Sugarcane Production NC II	AFFSCP215	603	2015-26		
3	Seaweeds Production NC II	AFFSWP215	652	2015-27		
4	Aquaculture NC II	AFFAQC204	1276	2004-21	12/09/04	01/23-24/05
5	Fish Capture NC I	AFFFSC105	352	2005-15	08/04/05	09/22-23/05
6	Agricultural Crops Production NC I	AFFACP105	302			
7	Agricultural Crops Production NC III	AFFACP306	445	2006-09	04/20/06	06/01-02/06
8	Fish Capture NC II	AFFFSC206	318			
9	Horticulture NC III	AFFHTC306	445			
10	Animal Health Care and Management NC III	AFFAHC307	208	2007-14	04/20/07	06/15-16/07
11	Fishing Gear Repair and Maintenance NC III	AFFFGR307	152			
12	Pest Management (Vegetables) NC II	AFFPMV207	312	2007-23	07/27/07	9/21/07
13	Fishport/Wharf Operation NC I	AFFFWO107	96	2007-37	11/22/07	1/15/08
14	Rice Machinery Operations NC II	AFFRMO207	232	2007-55	12/19/07	1/15/08
15	Landscape Installation and Maintenance (Softscape) NC II	AFFLIM208	212	2008-06	04/11/08	6/2/08
16	Artificial Insemination (Large Ruminants) NC II	AFFAIR212	220	2012-04	05/09/12	05/20-21/12
17	Artificial Insemination (Swine) NC II	AFFAIS212	175			
18	Rubber Processing NC II	AFFRPC212	162	2012-05		
19	Rubber Production NC II	AFFRPT212	322			
20	Organic Agriculture Production NC II	AFFOAP212	232	2012-09	09/17/12	10/5 & 7/12

21	Animal Production (Poultry-Chicken) NC II	AFFAPP213	266	2013-10	12/17/13	12/23&28/13
22	Animal Production (Swine) NC II	AFFAPS213	306			
23	Animal Production (Ruminants) NC II	AFFAPR213	306			
24	Agricultural Crops Production NC II	AFFACP213	336			
25	Agricultural Machinery Operations NC II	AFFAMO216	284	2016-03	03/30/16	4/17-18/2016
26	Milking Operation NC II	AFFMLO217	160	2017-07	02/03/17	03/03-04/17
27	Drying and Milling Plant Servicing NC III	AFFDMS317	256	2017-06		
28	Agroentrepreneurship NC II	AFFAGE217	239	2017-05		
29	Agroentrepreneurship NC III	AFFAGE317	445			
30	Agroentrepreneurship NC IV	AFFAGE417	715			
31	Bamboo Production NC II	AFFBPN217	195	2017-52	12/18/17	01/18-19/18

Annex B

Enrolled, Graduated, Assessed, and Certified Students in Agriculture, Forestry, and Fishery TRs per Region[1] (2017 and 2018)

Region	2017				2018 (as of September)			
	Enrolled	Graduated	Assessed	Certified	Enrolled	Graduated	Assessed	Certified
I	20,778	20,795	3,024	2,994	8,198	7,828	2,660	2,576
II	6,668	6,405	1,802	1,753	3,570	3,807	2,844	2,715
III	3,525	3,024	3,065	3,394	2,226	2,303	5,964	5,571
IV-A	4,622	4,400	2,610	2,455	2,870	2,381	4,857	4,672
IV-B	1,743	1,640	625	546	2,181	2,233	1,637	1,446
V	5,601	5,365	2,202	1,927	2,872	1,781	2,460	2,032
VI	6,260	5,509	2,840	2,758	3,222	2,951	3,848	3,758
VII	4,544	3,777	950	910	1,280	1,203	3,083	3,033
VIII	19,620	18,173	3,157	3,156	9,974	9,553	3,042	3,021
IX	5,517	4,955	4,121	3,911	1,800	1,142	2,817	2,608
X	12,335	9,271	3,028	2,896	5,218	3,900	6,208	5,817
XI	7,891	7,892	1,705	1,479	3,615	3,296	2,995	2,698
XII	5,140	4,008	4,063	3,382	4,870	4,386	6,715	5,849
NCR	372	367	???	???	1,416	1,367	???	???
CAR	3,373	3,047	1,934	1,846	2,970	3,164	2,324	2,203
CARAGA	2,605	2,321	751	746	2,057	1,890	1,702	1,622
ARMM	554	522	107	88	336	235	262	229

[1] The numbers of Assessed and Certified students may not match up well with the number of Graduates; it can be inferred that the year of Graduation is not necessarily the same year for Assessment and Certification.

Annex C

Enrolled, Graduated, Assessed, and Certified Students in Agriculture, Forestry, and Fishery TRs per Qualification (2017)

No.	Qualification	Enrolled	Graduated	Assessed	Certified
1	Agricultural Crops Production NC I	5,322	3,678	3,278	3,098
2	Agricultural Crops Production NC II	1,938	1,557	2,657	2,546
3	Agricultural Crops Production NC III	3,582	2,999	5,338	5,065
4	Agricultural Machinery Operation NC II	-	-	-	-
5	Agroentrepreneurship NC II	-	-	-	-
6	Agroentrepreneurship NC III	-	-	-	-
7	Agroentrepreneurship NC IV	-	-	-	-
8	Animal Health Care and Management NC III	46	23	122	122
9	Animal Production (Poultry-Chicken) NC II	1,330	1,368	4,189	3,763
10	Animal Production (Ruminants) NC II	848	622	754	740
11	Animal Production (Swine) NC II	1,806	1,385	2,198	2,119
12	Aquaculture NC II	872	884	457	450
13	Artificial Insemination (Large Ruminants) NC II	-	-	-	-
14	Artificial Insemination (Swine) NC II	-	-	-	-
15	Bamboo Production NC II	-	-	-	-
16	Drying and Milling Plant Servicing NC III	-	-	-	-
17	Fish Capture NC I	73	75	-	-
18	Fish Capture NC II	391	402	171	171
19	Fishing Gear Repair and Maintenance NC III	472	470	-	-
20	Fishport/Wharf Operation NC I	-	-	-	-
21	Grains Production NC II	-	-	-	-
22	Horticulture NC II	2,183	1,784	1,251	1,203
23	Horticulture NC III	619	490	400	395
24	Landscape Installation and Maintenance (Softscape) NC II	82	60	136	136
25	Milking Operation NC II	-	-	-	-
26	Organic Agriculture Production NC II	13,977	10,896	13,595	12,824
27	Pest Management (Vegetables) NC II	48	46	250	223
28	Rice Machinery Operations NC II	-	-	656	654
29	Rubber Processing NC II	-	-	-	-
30	Rubber Production NC II	357	309	879	732
31	Seaweeds Production NC II	-	-	-	-
32	Sugarcane Production NC II	-	-	-	-

Annex D

Identified Positions in the Agro-industries vis-à-vis Equivalent TVET Qualifications:

No.	Position	Equivalent TVET Qualifications (as proposed by the Industries)
1	Animal Caretaker	Animal Production NC II
2	Fish Farmer	Aquaculture NC II
3	Milk Operator	Milk Operations
4	Farm Caretaker	Agricultural Crops Production NC II
5	Fishpond Caretaker / Fish Farmer	Aquaculture NC II
6	Ricemill Operator	Ricemill Operation
7	Farm Caretaker	Agricultural Crops Production NC II
8	Animal Caretaker	Animal Production NC II
9	Organic Agriculture Production Worker	Organic Agricultural Production NC II
10	Agri-crops Production Worker	Agricultural Crops Production NC II
11	Farm Manager	- Aquaculture NC II - Trainers Methodology I - Organic Agricultural Production NC II - Agricultural Crops Production NC II
12	Tree and Shrub Crop Growers	Agricultural Crops Production NC II
13	Gardeners, Horticultural and Nursery	- Horticulture NC II - Agricultural Crops Production NC I
14	Rice Farmer	Agricultural Crops Production NC II
15	Turmeric and Seaweed Processing	- Product Packaging - Leadership / Organizational Management
16	Seaweed Processing	Leadership / Organizational Management
17	Swine Production	Refresher Seminar on Leadership
18	Noodle Making	- Tunnel Farming Technology - Product Enhancement Leadership
19	Machine Operator	- Shelling Machine Operations - Parer Operations
20	Shelling Machine Mechanic	SMAW NC II
21	Welder Mechanic / Boiler Operator	SMAW NC II
22	Automotive Mechanic / Electrician	Automotive Servicing NC II
23	Instrumentation Technician	Instrumentation and Control Servicing NC II
24	Materials Handling Operator (Payloader and Forklift)	Heavy Equipment Operations (Wheel Loader) NC II
25	Warehouse Crew	Heavy Equipment Operations (Forklift) NC II
26	Calibrations and Instrumentation Technician	Instrumentation and Control Servicing NC II
27	Chiller and Airconditioning Technician	RAC Servicing NC II
28	Process Technician	- Electrical Installation and Maintenance NC II

		- SMAW NC II - GMAW NC II
29	Coconut Water Concentrate (CWC) Production Operator	- Computer Hardware Servicing NC II - Mechatronics Servicing NC II - Computer Programming NC IV
30	Electrician	- Electrical Installation and Maintenance NC II - Building Wiring/Motor Control/ Transmission Line Installation and Maintenance NC II
31	Plumbing	Plumbing NC II
32	Bench Mechanic	- SMAW NC II / TIG / MIG - Machining NC II - Chemical Process Operations NC III - Computer Systems Servicing NC II - Electrical Installation and Maintenance NC II - Sugarcane Production NC II
33	Production Operator	- Milling and Blending Operator - Heavy Equipment Operations (Forklift) NC II - Electrical Installation and Maintenance NC II - SMAW NC II
34	Utilities Operator	- Mechanical Technician - SMAW NC II
35	Electrical Operator	- Electrical Installation and Maintenance NC II - SMAW NC II
36	Machinist	- Machining NC II - Lathe Machine Operations
37	Welders	SMAW NC II
38	Heavy Equipment Wheel Loader	Heavy Equipment Operations (Wheel Loader) NC II
39	Electrician	Electrical Installation and Maintenance NC II
40	Com Operator / Desheller	???
41	Nuts Parer	???
42	Plant Operator	Plant Operations
43	Plant Filler	Plant Operations
44	Test Shop Operator	Plant Operations
45	Kitchen Steward	???
46	Safety Engineer / Mechanical Supervisor / Mechanical Maintenance / Technician / Facilitating Engineer	Scaffold Erection NC II
47	Truck Operator / Truck Driver / Stacker-Reclaimer Operator	Heavy Equipment Operation (Bulldozer, Wheel Loader, Forklift) NC II
48	Electrical / Mechanical / Electronics Engineer / Technicians	Electricians / Mechanic / Electronics Operations
49	Corrugating Line Operator	Corrugating Machine Operation
50	Finishing Line Operator / Flexo Machine Operator	Flexo Machine Operation
51	Heavy Equipment Operator	Heavy Equipment Operation (Tractir, Forklift, Truck) NC II

52	Mechanical Trainee	- Automotive Servicing NC II - Electrical Installation and Maintenance NC II
53	Technician	RAC Servicing NC II
54	CNC Technician	SMAW NC II
55	Heavy Equipment Mechanic	- Heavy Equipment Operation NC II - Heavy Equipment Troubleshooting (Mechanical and Electronic)
56	Boiler / Filter Operator	- Boiler / Filtering Operations - Steam Generation Operation
57	Crane Operator	Heavy Equipment Operations (Crane) NC II

Policy Research and Evaluation Division | Planning Office
Office of the Deputy Director General for Policies and Planning
Technical Education and Skills Development Authority
TESDA Complex, East Service Road, South Superhighway,
Taguig City, Metro Manila
Tel. No. (+632) 888 5652 / 817 2675 / 893 1966
www.tesda.gov.ph

Picture Credits: http://freepik.com/