

Overview of the Agricultural Input Dealer Sector in Ghana

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INCOMPLETE DRAFT

Introduction

In 2009, the International Food Policy Research Institute (IFPRI) and the International Fertilizer Development Center (IFDC) jointly implemented a survey of agricultural input dealers in Ghana. The survey included questions that provide geo-referenced data on a wide range of characteristics of the agricultural input retail network in Ghana, as well as questions pertaining to the 2008 and 2009 subsidy programs.

The collaboration between IFPRI and IFDC presented a unique opportunity to reach the entire population of agricultural input dealers enabling a census, rather than a sampled survey, to be conducted. This paper presents the characteristics of Ghana's entire agricultural input dealer network -from table top dealers, to small retail shop owners, to fertilizer and chemical wholesalers. Basic information about the agricultural input dealer network in the country such as the number of dealers, the types of products they sell, and where they are located have not been accurately known for several years. The survey results fill that data gap and also goes beyond to detail the supply relationships between agricultural input dealers, and marketing practices in the sector. This survey also provides data by which the 'market smartness' of Ghana's 2008 and 2009 fertilizer subsidy programs, can be quantified. The characteristics of the network revealed will also be crucial for designing appropriate public private partnerships that can affect agricultural productivity in the country.

The survey results has produced the most accurate description of what kinds of products agricultural input dealers sell and other geo-referenced information on the agricultural input dealer network in Ghana. It has shown that there is a much higher number of fertilizer retailers in Ghana than previously thought. Prior to this data collection effort, the best estimate of the size of the fertilizer retail was from an FAO (2005) document which stated that "There are about 700 rural retailers of fertilizers spread throughout the country, with the highest concentration in the maize belt in the Brong Ahafo region". This project identified 3389 agricultural input dealers and interviewed 2893 of them. The data also shows that in Ghana, 80% of agricultural input dealers sell fertilizer; 91% sell crop protection chemicals; 67% sell agricultural tools, 59% seeds and only 3% sell animal feed. There is regional variation in the number of dealers as well as what products they sell. The highest density of fertilizer retailers by area is found in the Ashanti region.

We also show how fertilizer moves through Ghana to retailers ie, the supply chain. While the fertilizer arrives at the port in Accra, the analysis has shown that it is distributed mainly from Kumasi in the center of the country. The map shows an archetypical hub-and-spoke distribution

pattern of fertilizer. The locations of the hubs are, Kumasi in the Ashanti region, Tamale in the Northern region and Wa in the Upper West region.

The data shows that the 2008 voucher program did not utilize the full fertilizer distribution network, but rather, only 30% of fertilizer retailers on average were able to participate. The design of the voucher program required retailers to pass vouchers that they had received from farmers onto one of three major fertilizer importers in order to redeem the value of the voucher. This design relied on the assumption that a good proportion of fertilizer retailers had relationships with the fertilizer importers. However, the analysis of the network shows that only 11% of fertilizer retailers have direct links to fertilizer importers (through supply channel). 87% of fertilizer retailers who did not accept vouchers said it was because they had no way of redeeming them. The proportion of fertilizer retailers who were in the subsidized fertilizer network was higher in regions where market concentration was higher showing further suggesting the importance of relationship to an importer, or an agro dealer who has a relationship with an importer. The actual size of the subsidized fertilizer retail network grew to about 30% because retailers improvised ways to redeem value of vouchers by passing them through other retailers. This practice may have saved the network from being dramatically reduced. However, it also plausibly exposed retailers to exploitation by forcing them to rely on informal channels to redeem the vouchers.

This work helps to fill a critical knowledge gap on the agricultural input dealer network in Ghana. This contribution will make policy makers aware of the institutions and market practices that govern a sector that is critical for an agriculture-based economy. Knowledge about the structure and conduct of the agricultural input sector is crucial for policy makers to design a strategy for increasing agricultural productivity that is appropriate for the country context.

Regional variation in the country called for regional level analysis

The information is presented at a regional level to highlight the variation in these characteristics across regions and between the southern and northern part of the country. Several indicators of the level of development in Table 1 show the northern part significantly lagging behind the southern part in wealth, health and educational achievements. This dichotomy is also reflected in the regional differences in dealer characteristics and resource access as presented in the following chapter.

Table 1: Summary demographic characteristics of the regions of Ghana

Region	% of population with NO education	Median years of Schooling	Mean HH Size	Child Mortality	Under 5 Mortality	Poverty Head Count Ratio	Poverty Severity Index	Gini Index
South								

Western	15.7	7	4.7	14	65	0.33	0.11	0.05
Central	18	5.6	4.4	38	108	0.45	0.16	0.08
Greater Accra	9.2	8.9	4.6	14	50	0.13	0.04	0.02
Volta	19.6	5.6	4.7	13	50	0.5	0.19	0.09
Eastern	15	6.6	4.6	30	81	0.39	0.14	0.07
Ashanti	13.3	7	5.3	28	80	0.27	0.09	0.04
Brong Ahafo	26.4	3.8	5.3	41	76	0.44	0.16	0.08
North								
Northern	51.1	0	7.4	72	137	0.7	0.33	0.19
Upper East	43	0.8	7.2	33	78	0.72	0.34	0.2
Upper West	41.1	1	6.4	50	142	0.76	0.39	0.24

Source: DHS 2008, GLSS 2004/05

Survey implementation

The two goals of reaching several hundred dealers and producing a useable dataset in short time required a different surveying technique than paper surveying. The survey was administered electronically using portable handheld personal digital assistants precluding the need for data entry and ensuring data quality checks at the time the interview is being administered. The survey was launched on October 20th 2009 and was completed on Jan 22nd 2010.

During the actual survey, the final number of interviewed agro-dealers fell from the 3389 retailers identified to 2893. This was due mainly to the fact, that some of the table top dealers and other transient retailers could not be located. Nevertheless, out of the 2893 identified dealers, 2819 agreed to be interviewed which resulted in 97 % response rate.

1. Basic Characteristics of the Agricultural Input Dealer Sector

Number of retailers and spatial dispersion of the network (dealer density)

Table 2: Number of agricultural retailers

Region	Agro-Dealers 2009
Ashanti	761

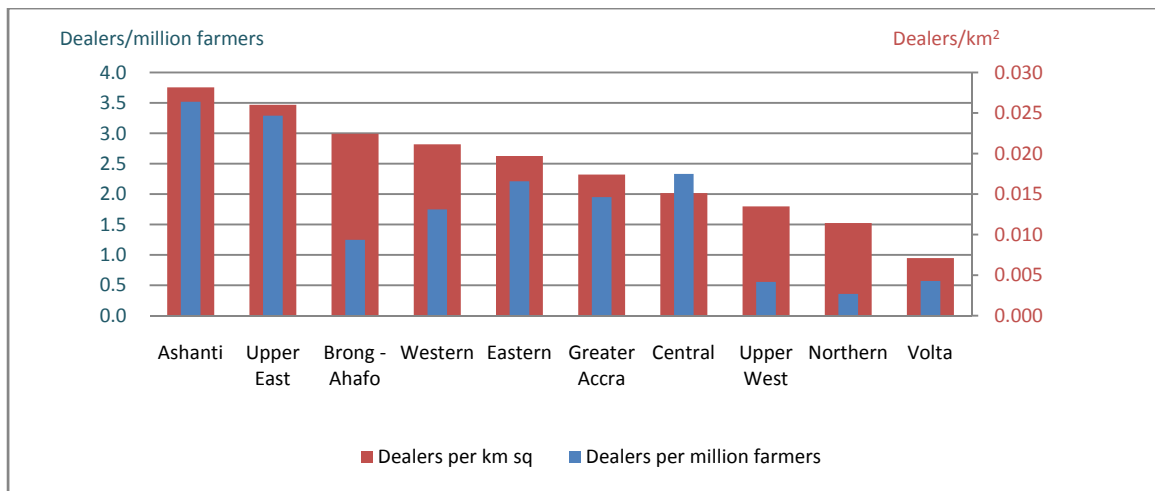
Brong - Ahafo	429
Central	176
Eastern	350
Greater Accra	71
Northern	307
Upper East	219
Upper West	94
Volta	107
Western	373
South	2,207
North	612
Total	2,893

Even though the Northern part of the country has significantly larger number of wholesalers (as seen in Table 2), their size is significantly smaller than the size of Northern wholesalers. In the size, an average value of Southern fertilizer wholesale's stock is twice the size of the Northern one (15,108 vs 6,717). The different business type organization between the two areas is also reflected in the level of specialization among the agro-dealers in the North and in the South. While in the North, 25 % of the agro-dealers specialize in selling only fertilizers, in the South only 0.5 % of agro-dealers

specialize solely in fertilizers.

Figure 1 shows the variation in the population and area densities of the agro-dealers by region. With the exception of Upper East, the northern part of the country, mainly Upper West and Northern region, show a significantly lower density (both in population and area terms) of dealers compared to the Southern part of the country. Ashanti is the highest ranking region in both density terms while Volta, Upper West and Northern lag significantly behind the country average.

Figure 1: Agricultural input dealer densities by Region



Dealer density is likely an important determinant of farmer's access to inputs. The correlation coefficient between the regional poverty headcount ratios and the number of dealers per million farmers is -0.296. The correlation between the same variable and the number of dealers per square kilometer is -0.375. The correlation coefficients among the measure of poverty severity and the respective dealer densities are also negative at -0.278 and -0.371. From the negative sign and the magnitude of the correlation coefficients, it is evident that farmers in poorer regions have lower access to agricultural inputs.

Basic characteristics of agro-dealerships and agro-dealers

As seen in Table 3, in the Southern part of the country, 84 % of the agricultural input sellers are general stockists selling multiple types of agricultural inputs. While in the Northern part, the business type structure of the sector is equally divided among stockists, wholesalers and table top dealers. Only 6 % of agro-dealers in the South are wholesalers, while 33 % of agro-dealers in the North self-identify as wholesalers.

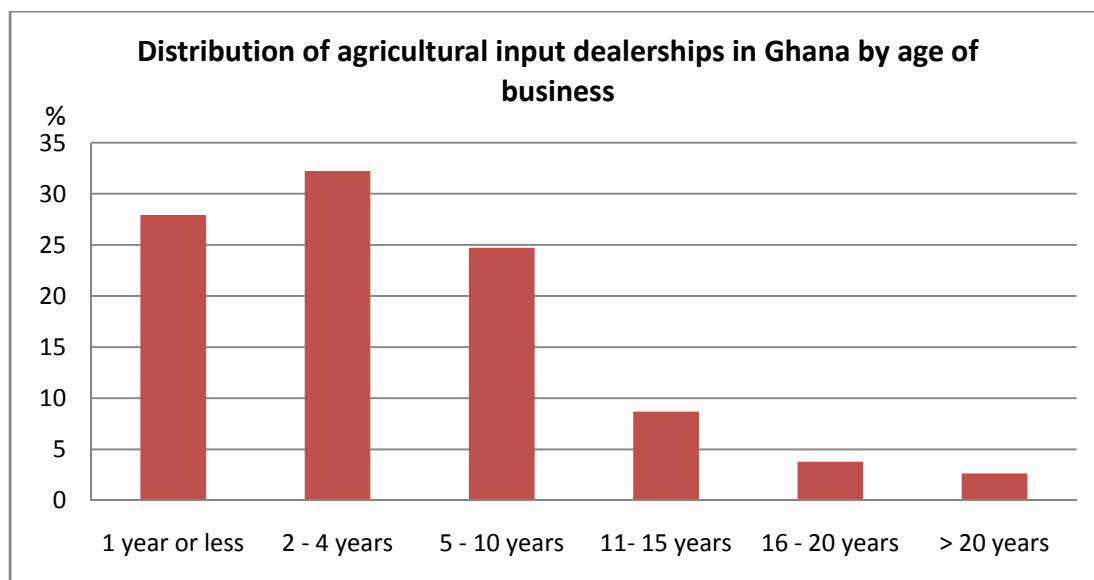
While the business organization differs among regions, the ownership structure of enterprises is fairly uniform across the country (Table 3). The majority of the agricultural input enterprises in Ghana are family owned, sole ownerships, established and operated from owners' own funds. Only 3% of agro-dealers in Ghana are private, limited liability partnerships. This type of business organization leaves owners more vulnerable to the loss of personal assets and bearing the full brunt of the enterprises' potential financial losses.

Table 3: Description of agricultural input dealer by type of establishment/ business by region.

Region	Stockist	Wholesaler	Tabletop Dealer	Sole Ownership	Partnership/ Limited Company
Ashanti	79%	9%	11%	84%	6%
Brong - Ahafo	87%	6%	5%	92%	1%
Central	94%	3%	3%	91%	2%
Eastern	81%	5%	10%	86%	3%
Greater Accra	87%	11%	2%	74%	8%
Northern	42%	35%	18%	93%	1%
Upper East	22%	31%	47%	94%	1%
Upper West	58%	32%	11%	82%	8%
Volta	84%	7%	4%	86%	4%
Western	86%	2%	9%	90%	2%
Total	74%	12%	12%	88%	3%

Most of the agricultural input enterprises are on average 5.3 years old. 29.76 % of dealers could be considered new entrants as they have been in operation for less than 2 years, but 17.63 % are more than 10 years old (Figure 2). Seed and fertilizer wholesalers have been on average the longest operating with 10.8 and 6.8 years of operation, while chemical wholesalers and table top dealers are on average the youngest with less than 4 years of operation.

Figure 2: Distribution of agricultural input dealership in Ghana by age of business



In all Ghana, agro-dealerships are primarily male owned and owner managed. As seen in Table 4 and 5, agro-dealers in the North are significantly disadvantaged in terms of education and training experience as the number of owners with no education are significantly above the country’s 12 % average in the Upper East and West, and the Northern regions, and middle school education is way below the country’s 38 % average. Brong Ahafo and Ashanti agricultural input enterprise owners show highest educational achievement.

Table 4: Demographic characteristics of agricultural input dealers

	% of owners male	Average age of owner	Owner has no education	Middle School or JSS
Ashanti	82%	42	4%	47%
Brong - Ahafo	84%	41	5%	49%
Central	84%	43	3%	36%
Eastern	85%	42	1%	42%
Greater Accra	81%	44	0%	23%
Volta	78%	45	1%	31%
Western	78%	41	4%	41%
Northern	92%	38	47%	18%
Upper East	54%	37	46%	15%
Upper West	92%	41	25%	28%
Ghana	81%	41	12%	38%

Northern and Upper East regions owners also show significantly less access to training than the remaining regions, with only 18 % of Upper East owners receiving training in the last two years, and 75 % owners never receiving any. The lower educational achievement in the northern regions is consistent with the region wide educational achievements reported in Table 1. Given that the majority of agricultural input dealers handle fertilizers and chemicals on daily basis, the lack of training is a

worrying indicator.

2. Type of products sold and determinants of sales

There is regional variation in the types of goods sold by agricultural input enterprises. As seen in Table 6 there is a strong regional variation in the percentage of agricultural dealers selling fertilizers ranging from 97 % in the Upper East region to 60 % in the Northern region. Greater Accra and Northern region show significantly lower percentage of agricultural input dealers selling fertilizers compared to the 79 % country average. On the other hand, more than 90 % of agro-dealers in the Central and Upper East regions sell fertilizers. With the exception of the

Upper East region, the percentage of agro-dealers selling chemicals in each region is significantly more consistent across the regions and higher percentage of agro-dealers in each regions sells protection chemical products to their customers compared to fertilizer availability. This is also reflected in the 91 % country average for chemicals.

Table 5: Percentage of agricultural input dealers selling specific products

Region	Percentage of dealers who sell:				
	Fertilizers	Chemicals	Seeds	Tools and Equipment	Animal Feed
Ashanti	79%	98%	59%	68%	1%
Brong - Ahafo	80%	94%	62%	77%	1%
Central	91%	99%	79%	91%	9%
Eastern	83%	98%	80%	75%	6%
Greater Accra	66%	94%	79%	77%	18%
Northern	60%	91%	45%	54%	1%
Upper East	97%	36%	30%	21%	2%
Upper West	76%	83%	60%	49%	5%
Volta	75%	93%	70%	75%	13%
Western	75%	95%	65%	82%	3%
South	80%	97%	66%	76%	4%
North	76%	70%	39%	38%	2%
Total	79%	91%	61%	67%	3%

Only a very small percentage (3 % nationally) of agro-dealers sells animal feed. Even in the regions with the highest percentage, Greater Accra and Volta, the percentage of agro-dealers selling animal feed is less than 20 %. On the other hand, 61 % of agro-dealers in Ghana sell improved seeds, but this percentage hides a large regional variation. Only 39 % of agro-dealers in the North, compared to 66 % of agro-dealers in the South sell improved seeds to their customers.

Chemicals

91 % of agricultural input dealers report selling protection chemicals. The only exception is the Upper East region where only 36 % of dealers report selling chemicals. Pesticides are the most frequently sold chemicals with 90 % of Ghana dealers reporting selling them, followed by

insecticides with 84 % of the dealers. Insecticides' sales are significantly less prevalent in the northern part of the country with only 60 % Northern region dealers, 34 % of Upper East and 75 % of Upper West dealers selling them compared to high selling southern regions like Central (97 %) and Eastern (96 %).

The majority of agricultural dealers that sell chemicals sell directly to smallholder farmers and to a varying degree to large scale, commercial farmers. Ashanti, Greater Accra and Northern region are the only three regions where agro-dealers supply a substantial share of their products to commercial, large-scale farmers. There is a varying degree of cross-supply among agro-dealers in different regions. In Greater Accra and the Northern regions, significant percentage of agro-dealers supply products to other agro-dealers in their proximity, while in the Western and Brong Ahafo, only 7 % of agro-dealers report selling their products to other dealers in the area. For the country as a whole, 17 % of agro-dealers report selling to other agro-dealers.

The sold chemicals are used on a variety of crops which show a significant variation across the regions with the exception of maize and vegetables that show a significantly high chemical usage across the regions. 82 % of agro-dealers report that the purchased chemicals are being used on vegetables and 88 % of them report usage on maize. These numbers are uniformly high throughout the country with the exception of Northern regions where use of chemicals on vegetables is significantly lower compared to the rest of the country. As for other crops, cocoa and cassava are large recipients of protective chemicals in the Ashanti, Central and Western regions. Brong Ahafo shows a significant usage of chemicals on various fruits. In the northern part of the country, most of the remaining chemical usage is concentrated on millet and sorghum as well as rice.

Fertilizers

84 % of agricultural input dealers report selling fertilizers in 2009. Northern region is the lowest selling region with 66 % of dealers reporting fertilizer sales and Upper East is the highest selling region with 99 % of dealers reporting selling fertilizers. Sulphate of ammonia is the most frequently sold fertilizer with 82 % of Ghana dealers reporting selling it, followed by NPK mix with 79 % of the dealers. Urea sales are less prevalent throughout the country, with slightly less than 50 % of dealers in most of the regions selling urea. The exceptions are Upper East and Greater Accra where the urea sales are well above the country average of 45 %. (Look at crops and why??) The majority of agricultural dealers that sell fertilizers sell directly to smallholder farmers and only Ashanti, Greater Accra and Northern report large % of customers being large scale commercial farmers. In Greater Accra, Northern region and Upper East, other agro-dealers also purchase significant share of fertilizers. Most likely, this stems from the fact that the fertilizer is transported from the hub cities to specific dealers, who when re-sell the fertilizers to the rest of the dealers in the area.

The sold fertilizers are used on a variety of crops which show a very similar pattern across the regions as the use of chemicals. Cocoa, cassava and vegetables are heavily fertilized in the southern states, while rice, millet, sorghum and vegetables are the major fertilizer recipients in the North.

Improved seeds and other products

On average, 61 % of agricultural dealers in Ghana supply improved seeds to their customers. The percentage of agro-dealers selling improved seeds is significantly higher in Central, Eastern and Greater Accra regions, compared to the rest of the country. Upper East and Northern regions are particularly low on improved seeds sales. The majority of improved seeds sold are of maize and various vegetables including tomatoes, peppers, garden eggs and onions. Other grains are not significantly represented in the improved seed sales.

Vast majority of agricultural input dealers does not specialize in selling animal feed. Only 3 % of agro-dealers report selling animal feed. The only regions with slightly significant animal feed sales are Greater Accra and Volta with 18 % and 13 % of agro-dealers selling animal feed in these regions. The animal feed sold is predominantly for feeding poultry, sheep and goats. On the other hand, 67 % of agro-dealers sell agricultural tools. Many of the tools sold are complementary products to fertilizer and chemicals usage like gloves, sprayers, masks and knap sacks.

3. Sources of financing and business practices

Sources of financing

Despite 76 % of Ghana agricultural input dealers reporting having a bank account, access to loans and bank financing is very low as only 7 % of enterprises report financing part of their startup capital through bank loan, and equal percentage report using bank financing for current enterprise operation. The majority of start up and operating capital is coming from personal sources with 90 % of enterprises relying on own funding for startup and 9 % relying on family funding for start up. Similarly, 81 % of enterprises rely on profit from business operation to finance the running of the enterprise. The access to banking sources is uniformly low across the regions with less than 10 % of enterprises in all but Eastern and Central region reporting obtaining a loan for enterprise start up. Even in Eastern and Central regions, only 12 % and 13 % of enterprises were able to obtain loan for enterprise start up. Alternative sources of finance like cooperatives and microfinance institutions play almost no role in financing with less than 2 % of enterprises relying on these sources for start up and enterprise operation.

Table 6: Sources of Financing for agricultural input dealerships

	Sources of Start Up Capital			Sources of Financing Current Operations		
	Personal resources	Family	Banks	Profits from this business	Personal resources	Banks
Ashanti	93%	8%	5%	60%	87%	7%
Brong - Ahafo	91%	10%	6%	97%	86%	7%
Central	86%	4%	13%	93%	45%	10%
Eastern	86%	6%	12%	73%	73%	11%
Greater Accra	87%	10%	8%	97%	66%	13%
Northern	95%	7%	2%	96%	93%	4%
Upper East	92%	12%	6%	83%	80%	3%
Upper West	76%	21%	4%	78%	75%	7%
Volta	89%	10%	16%	92%	73%	15%
Western	87%	9%	7%	93%	78%	7%
Ghana	90%	9%	7%	81%	80%	7%

Startup costs in 2009

The cost of establishing new business in 2009 also differed among the regions. The median amount of startup capital needed to establish an agricultural input dealership in Ghana in 2009 was 500 Cedis. Agro-dealers in the Northern and Upper East regions both reported the lowest median startup costs of 200 Cedis. Greater Accra and Central regions are the most expensive in terms of start-up with a median of 3850 and 1500 Cedis for agro-dealerships established in 2009. The remaining regions startup costs are very close to the country average.

In addition, the 2009 start up costs varied by the business type (Table 8). As expected, table top dealers had the lowest startup cost with a median of 200 Cedis, while seed and fertilizer wholesalers are the most expensive ones to establish with 1000 and 900 Cedis start up cost. The reported median startup cost of general stockist business in 2009 was 800 Cedis. The cost of establishing different type of agricultural input business also differed significantly between the Northern and the Southern regions (Table 8). Only for the stockist business was the cost of start up fairly consistent across the northern and southern part of the country. For all the other business types, the median cost of establishing agricultural input business was way higher in the Northern part of the country, with the most pronounced difference being among seed wholesalers (it cost almost 8 times as much to start a seed wholesale business in the southern part compared to the North). For table top dealers, the cost of start up in the South was also almost five times the cost of the northern start up.

Table 7: Startup capital amounts by location and type of business

	Median amount of startup capital	Median amount - Stockist	Median amount - Fertilizer wholesaler	Median amount - Chemical wholesaler	Median amount - Seed wholesaler	Median amount - Table top dealer
North	300	600	700	200	200	60
South	500	700	1000	400	1500	250
Ghana	500	700	800	322	1000	200

Credit

34 % of agro-dealers reported being able to purchase goods on credit from their most important supplier, and 53 % of agro-dealers report being able to purchase on credit from their second most important supplier. 23 % of agro-dealers are able to purchase fertilizers and pesticides on credit from their most important supplier and only 8 % are able to purchase improved seeds and 7 % tools on credit. For second most important supplier, the credit supplied drops to 11 % for pesticides and 9 % for fertilizers, and there is almost no credit available for improved seeds, and other agricultural inputs.

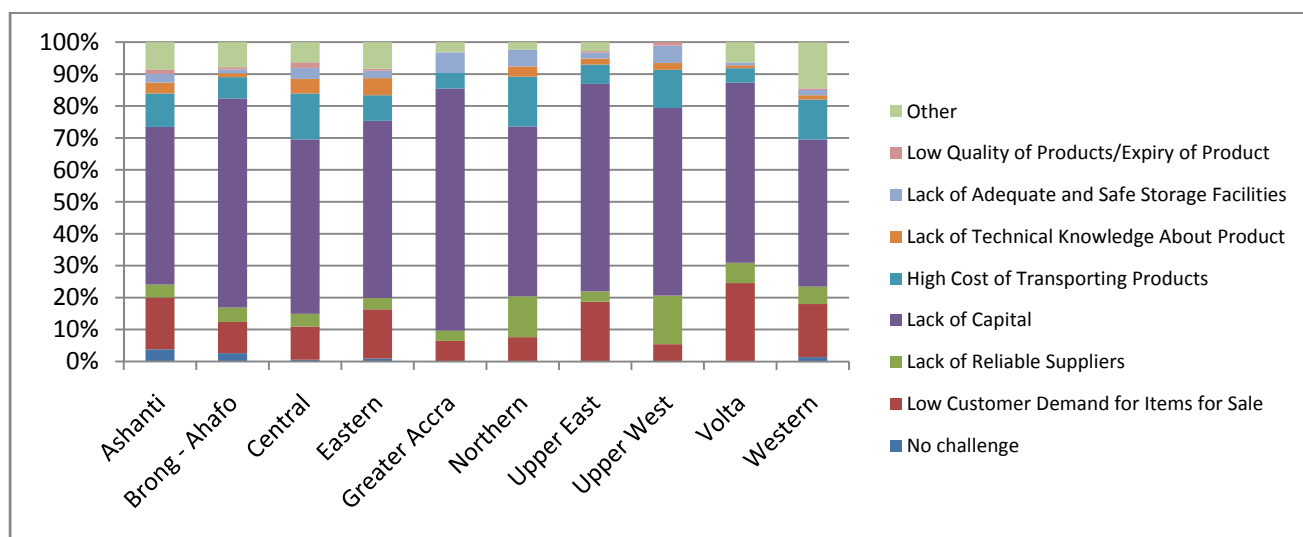
Central, Western and Ashanti regions are the most credit deprived with only 15 %, 18 % and 22 % of agro-dealers in these regions reporting purchasing goods on credits from their most important supplier. The northern regions are more successful in accessing supplier credit with 61 % of agro-dealers in Upper East and 59 % of agro-dealers in Upper West reporting receiving credit from their most important supplier. From the southern states, Brong Ahafo ranks the highest in supplier credit access with 42 % of agro-dealers receiving credit from their most important suppliers. In all regions, the agro-dealers with access to supplier credit report being able to purchase fertilizers, and pesticides on credit. Very few suppliers extend credit to their customers for purchases of improved seeds, animal feed and tools.

On a positive note, 63 % of agricultural input dealers report selling at least one type of product on credit to their customers. 42.9 % of dealers reports selling fertilizers on credit, 49.3 % and 52.76 % sell weedicides and insecticides on credit. The number of dealers willing to sell to customer on credit varies significantly by region. In Greater Accra only 37 % dealers sell on credit, while in Upper West 77 % of dealers provide credit to their customers.

4. Challenges to business operation

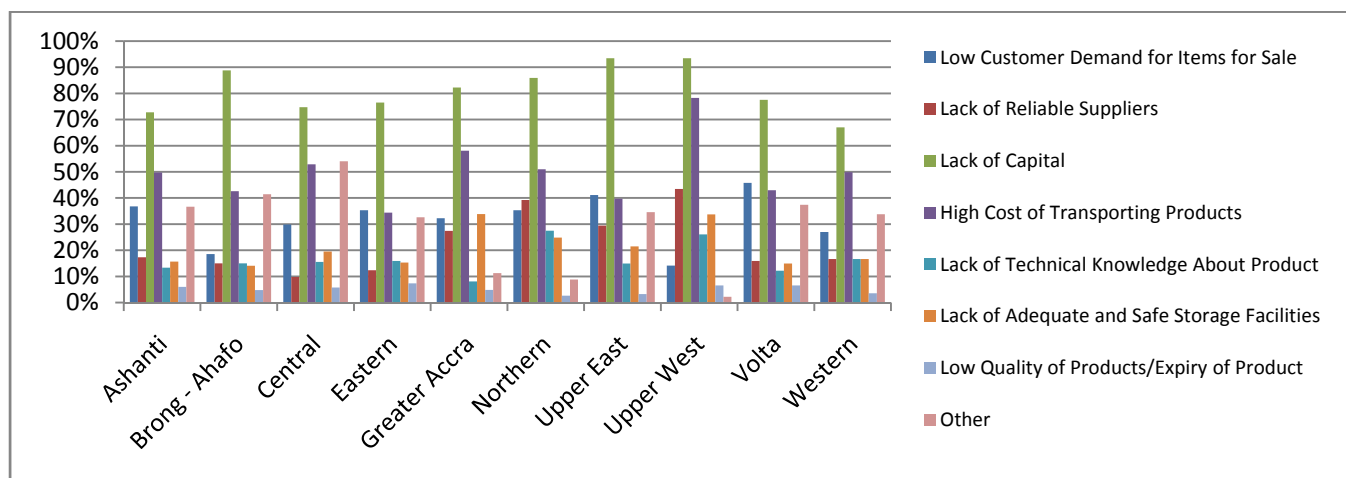
The majority of agricultural input dealers perceive lack of available capital (79 %), followed by high cost of transporting products (47 %) and low customer demand (32 %) as key challenges to business operations. Lack of technical knowledge about product and lack of reliable suppliers also pose challenges to business operation. When asked to rank challenges by severity (Figure X), lack of available capital was uniformly ranked as the most important challenge to running a business in all regions by a vast majority. For the majority of southern regions, lack of customer demand is the number two most frequently cited obstacle. On the other hand, for Northern and Upper West regions lack of reliable suppliers ranks second on the list.

Figure 3: Top challenge to business operation by region



Lack of capital is also the highest cited obstacle by all dealers with more than 70 % of dealers in all regions citing it as a challenge, when given the option to list all challenges. This is not a surprising finding, given the lack of access to loans and supplier credits described in detail in Section 3.

Figure 4: Percentage of enterprises that perceive a given obstacle as challenge by region



Transportation

47.5 % of agricultural dealers perceive transportation availability and cost a challenge to enterprise operation. Upper West region is particularly affected by transportation vows with 78 % of agro-dealers citing transportation as an obstacle. The problems with transportation are also reflected in the fact that only 7 % of agro-dealers report providing their customers with product transport. Similarly, for only 9 % of agro-dealers in Ghana, their most important supplier provides and pays for transport, and the percentage drops to 5 % from second most important supplier. The majority of agro-dealers (86 %) pays and provides for their own transport when purchasing from their most important supplier. Arrangements in which buyer pays for transport and supplier provides means of transportation are also rare with only 8 % of agricultural input dealers relying on this arrangement with their main supplier.

Table 8: Transportation arrangements by supplier and region

	Most Important Supplier				Second Most Important Supplier			
	% making new orders in person or send someone	Supplier provides and pays for transport	Supplier provides and buyer pays for transport	Buyer provides and pays for transport	% making new orders in person or send someone	Supplier provides and pays for transport	Supplier provides and buyer pays for transport	Buyer provides and pays for transport

	e							
Ashanti	92%	6%	8%	88%	55%	2%	5%	54%
Brong - Ahafo	90%	8%	12%	89%	55%	4%	7%	54%
Central	85%	14%	13%	84%	69%	13%	6%	68%
Eastern	86%	13%	10%	83%	52%	9%	6%	54%
Greater Accra	81%	10%	5%	85%	76%	2%	6%	85%
Northern	94%	11%	3%	89%	63%	5%	1%	62%
Upper East	95%	11%	0%	79%	37%	3%	0%	36%
Upper West	89%	5%	9%	87%	55%	4%	7%	55%
Volta	74%	10%	12%	82%	71%	8%	7%	77%
Western	88%	8%	7%	87%	54%	7%	2%	53%
Ghana	89%	9%	8%	86%	56%	5%	4%	56%

Connectivity is clearly an issue when taking into account the fact that 89 % of agro-dealers report making at least part of their orders from their most important supplier in person, and 59 % report making orders from second most important supplier in person. Only 6 % of agro-dealers have a supplier's representative visit in their store, and the percentage drops to 4 % for the second most important suppliers' representatives.

Lack of reliable suppliers

17 % of Ghana agricultural input dealers perceive lack of reliable suppliers to be an obstacle to business operation. The problem is particularly pronounced in the northern part of the country, with 39 % of Northern, 29 % of Upper East and 43 % of Upper West suppliers complaining about supplier availability and reliability. This is also reflected in the average number of suppliers in these regions. In the North, the average dealer has between 1.5 to 1.8 suppliers

which is significantly lower compared to the Southern regions. In Greater Accra, dealers have on average 4.4 suppliers and 3.2 in Central region. Southern region with the lowest supplier average is Brong Ahafo with 2.0 suppliers which are still considerably larger than 1.5 averages in Upper East. 27 % of Greater Accra dealers are listing suppliers as a challenge despite having the highest average number of suppliers from the regions. This high % of complaints is most likely a reflection of issues with supplier reliability rather than availability.

One important factor to note is that the majority of supplier/buyer relationships are based on personal relationships between the two parties. 89 % of agricultural dealers reported dealing with their suppliers in person when making new orders. This fact puts considerable limitations on supplier availability in some regions which are quite a distance from the main supplying hubs located Ashanti. For many states, the distance to these hubs limits them quite frequently to purchasing supplies from other agricultural input dealers located in their vicinity even if they are not necessarily the most reliable or even if their number is limited. Particularly in the Northern part of the country 61 % of Northern region dealers rely on suppliers in their region for their suppliers, similarly 61 % of Upper East dealers and 61 % of Upper West dealers rely on suppliers within their own regions.

On the other hand, agro-dealers with lower rate of complaints about supplier reliability and availability show significantly more regionally diversified supplier portfolio and decreased reliance on other dealers located directly in their regions. Central and Eastern region have the lowest complaints rate, and show lowest reliance on their own region for their supplier network. Only 20 % of agro-dealers in Central region and 24 % suppliers in Eastern region rely on other suppliers in their network. In reverse, Greater Accra that has the highest complaint rate among the Southern states shows 86 % of agricultural input dealers relying on suppliers located in the same region.

Lack of technical knowledge

16 % of agricultural dealers perceive lack of technical knowledge as a significant challenge to the running of their enterprise. This percentage is even higher in the Northern and Upper West regions where 27 % and 26 % of agro-dealers perceive it to be an obstacle. This is not a surprising finding when we look at the fact that 36 % of agro-dealers report never receiving any formal training. This percentage hides significant regional variations. For example in the Upper East a staggering 75 % of agro-dealers never received any formal training, and Northern region has 55 % of untrained agro-dealers.

Table 9: Training timing and content

	Formal training received		Content of training if received one			
	Less than 2 years ago	Never received formal training	Proper application and recommended dose	Product use and safe handling	Resolve specific issues farmers complain of	Safe handling and storage of products
Ashanti	64%	31%	94%	79%	59%	79%
Brong - Ahafo	69%	28%	94%	91%	77%	91%
Central	80%	12%	98%	92%	65%	84%
Eastern	55%	36%	94%	82%	47%	78%
Greater Accra	63%	18%	86%	65%	45%	84%
Volta	62%	30%	86%	60%	38%	79%
Western	51%	39%	93%	92%	65%	82%
Northern	34%	55%	96%	77%	70%	76%
Upper East	18%	75%	96%	91%	53%	85%
Upper West	63%	32%	94%	86%	38%	70%
Ghana	56%	36%	94%	83%	60%	82%

Even for the dealers who received some form of training, the content and timing of the training differs significantly. On average, only 56 % of all agro-dealers received some form of training in the last 2 years. 94 % of agricultural dealers with some training report learning about proper application and recommended dosage for fertilizers and chemicals. 82 % of trained agro-dealers

receive training in demonstrating proper usage and a demonstration of proper storage and safe handling of products while in the store. On the other hand, only 57 % of agro-dealers received training in general business management.

The probability that an agro-dealer received training at some point of their business operation increases slightly if they sell chemicals or fertilizer to 68 %, but that still leaves 34 % of agricultural dealers who handle chemicals and fertilizers on daily basis without ever receiving instruction in their safe handling and usage. The lack of training can have potentially dangerous consequence when taking into account the fact that 23 % of agricultural dealers split bags of chemicals and 73 % split bags of fertilizers. In addition, these dealers are further instructing their customers on how to use chemicals and fertilizers, without ever receiving any training themselves. 92 % of agricultural input dealers report advising customers on types of products to use and on proper application techniques, despite many of them never receiving training in these activities themselves.

In terms of training providing agencies, the Ministry of Agriculture (MoFA) is the most important training provider, with 41 % of agro-dealers reporting receiving training from them. With the exception of Volta, MoFA uniformly provided training to the largest percentage of agricultural input dealers in all regions. GAIDA and EPA follow with 29 % and 27% of agro-dealers trained. GAIDA was the most important training provider in Volta, and second most important provider in the majority of the regions with the exception of Ashanti, Central and Western region where EPA provided training to slightly higher percentage of agro-dealers. Central region has the largest percentage of agro-dealers receiving training from all the different agencies, while Upper East and Northern regions lag significantly behind the rest of Ghana in training access and training agencies presence. One important thing to note is also the fact that many agro-dealers received training from multiple agencies.

Table 10: Organization providing training to agricultural input dealers

	IFDC	GAIDA	MOFA	MIDA	EPA	SEEDPAG	APFOG	Other
Ashanti	16%	28%	44%	7%	30%	3%	1%	19%
Brong - Ahafo	18%	39%	54%	5%	36%	3%	1%	15%
Central	47%	54%	63%	24%	57%	3%	2%	22%
Eastern	14%	28%	38%	13%	28%	6%	4%	14%
Greater Accra	23%	37%	42%	7%	27%	10%	1%	3%
Northern	8%	12%	25%	1%	6%	1%	0%	15%
Upper East	8%	17%	19%	4%	16%	5%	0%	4%

Upper West	26%	43%	45%	2%	15%	5%	0%	9%
Volta	21%	46%	36%	3%	29%	2%	0%	12%
Western	11%	18%	37%	2%	21%	1%	0%	21%
Total	16%	29%	41%	7%	27%	3%	1%	16%

Fertilizer Supply Chain

All fertilizer in the country is imported and arrives in ports at the approximate positions shown by the red star in Figure 2. The figure shows the top three sources of fertilizer stock that retailers carry in the south of the country and the top three suppliers of retailers in the north of the country. Each of the suppliers is joined by a line to the retailer which it supplies. While the fertilizer arrives at the port in Accra, the analysis has shown that it is distributed mainly from Kumasi in the center of the country. The map shows an archetypical hub-and-spoke distribution pattern of fertilizer. The locations of the hubs are, Kumasi in the Ashanti region, Tamale in the Northern region and Wa in the Upper West region.

Figure 2: Fertilizer distribution in Ghana

Include average number of suppliers table here

5. Agricultural input sector: new entrants vs. long standing enterprises

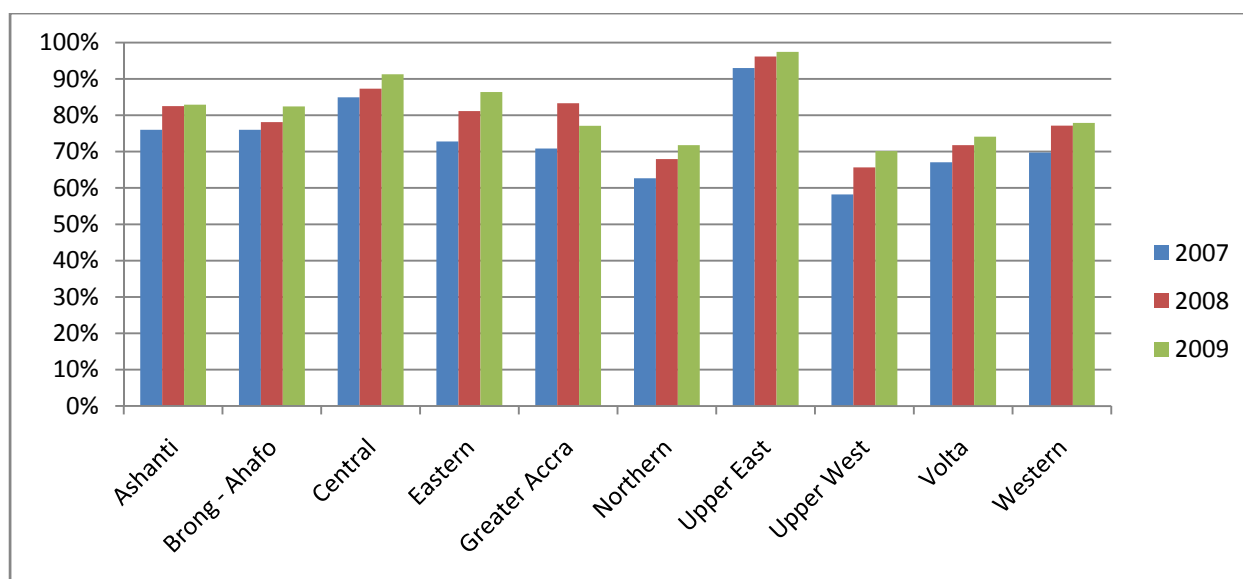
Since the agricultural input dealers' survey was the first of its kind, we do not have the entry and exit information for the sector in the previous years. However, we do ask recall questions for 2007, 2008, and 2009 from the enterprises in existence in 2009. Hence, we are able to observe the general trends in the fertilizer sector over the three year period by just looking at the enterprises that existed in all the three years (2007 – 2009). In addition, it is also interesting to look at the differences among the newly established agricultural dealers (2008/2009 establishment year) and the longer standing enterprises to evaluate the ease of entry into the individual input product markets.

Fertilizer Sales Over time

Looking only at enterprises that were established in or prior to 2007, there is a clearly visible trend in the last 3 years among agro-dealers towards including fertilizers as a product sold in their stores. In 2007, 74 % of agricultural dealers stocked fertilizers. This percentage rose significantly to 80 % in 2008 and 82 % in 2009. With the exception of Greater Accra, the percentage of existing agro-dealers stocking fertilizer rose in all regions.

Despite the uniform upward trend, there are significant differences in the percentage of agro-dealers selling fertilizers, as well as different growth rates in fertilizer agro-dealers across regions. Eastern and Upper West regions experienced highest growth in the number of agro-dealers selling fertilizers between 2007 and 2009 (14 % and 12 %) while Upper East displays lowest increase by 4 % which can be easily explained by the fact that the percentage of agro-dealers selling fertilizers in the Upper East was very high (93 %) in 2007 to start with.

Figure 5: Participation in Fertilizer sales over time of enterprises established pre-2008 and existing in 2009



For agro-dealers, who didn't sell fertilizers between 2007 and 2009, the top three reasons for not selling fertilizers didn't change, but their importance rebalanced. In 2007, 57 % of agro-dealers (who did not sell fertilizers) reported not selling fertilizer because they could not afford to stock them, but in 2008 and 2009 the percentage of agro-dealers with this problem dropped to 24 % and 22 %. While in 2007, 6 % of agro-dealers reported being unable to obtain fertilizers to sell, this percentage rose sharply in 2008 to 38 % and stagnated at 38 % in 2009. Lack of storage space for fertilizers was another commonly cited obstacle to stocking fertilizers.

Table 11: Reasons for which establishment did not participate in fertilizer sales by year and region

	Main reasons for not selling fertilizers in 2007			Main reasons for not selling fertilizers in 2008			Main reasons for not selling fertilizers in 2009				
	Could not afford to stock fertilizer	Could not obtain fertilizer to sell	Did not have storage space	Could not afford to stock fertilizer	Could not obtain fertilizer to sell	Did not have storage space	Could not afford to stock fert.	Could not obtain fert. to sell	Did not have storage space	Not eligible to redeem vouchers	Voucher difficult to redeem
Ashanti	74%	0%	2%	30%	36%	3%	25%	44%	3%	0%	1%
Brong - Ahafo	37%	0%	1%	26%	20%	2%	33%	18%	2%	20%	0%
Central	47%	0%	11%	0%	56%	6%	0%	36%	0%	0%	0%
Eastern	42%	2%	0%	7%	21%	0%	0%	15%	0%	15%	15%
Greater Accra	7%	21%	21%	13%	38%	38%	18%	18%	27%	36%	0%
Norther	78%	10%	5%	33%	69%	7%	24%	71%	3%	3%	0%

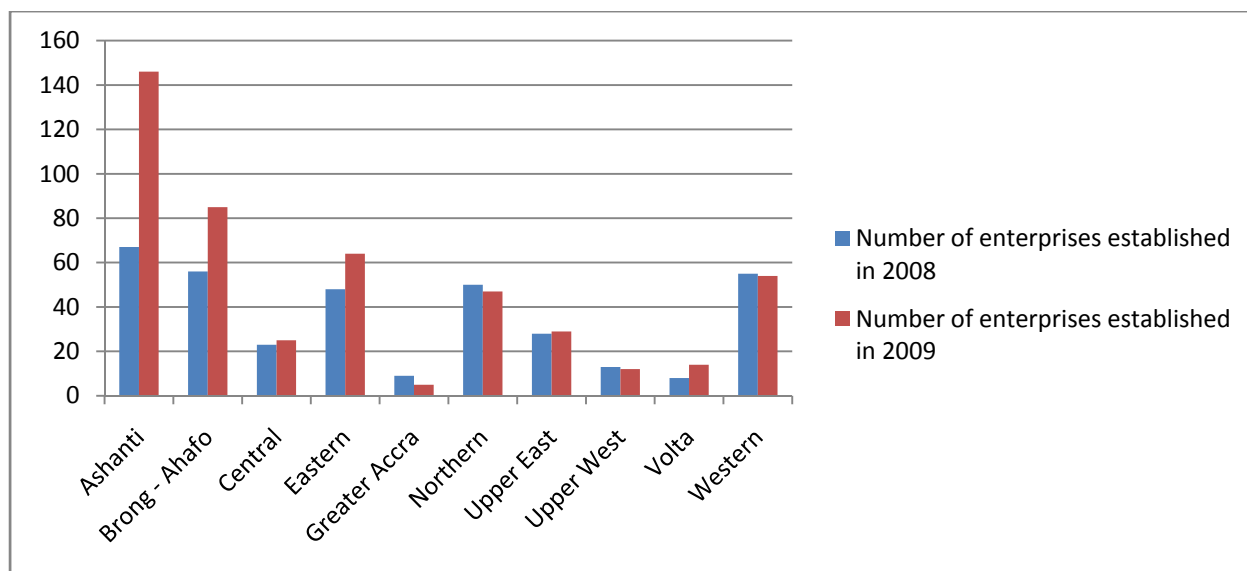
n												
Upper East	73%	9%	0%	50%	0%	0%	25%	0%	0%	0%	0%	25%
Upper West	61%	11%	14%	13%	43%	13%	20%	35%	15%	5%	5%	5%
Volta	61%	4%	0%	46%	17%	0%	44%	22%	0%	0%	0%	0%
Western	46%	15%	4%	19%	41%	3%	14%	32%	2%	0%	0%	0%
Ghana	57%	6%	4%	24%	38%	5%	22%	38%	4%	6%	6%	2%

However, the general country wide trends hide significant regional variations in the reasons why agro-dealers didn't participate in fertilizer sales. While in 2007 all regions, but Greater Accra, reported fertilizer affordability as the key reason for not stocking them, in 2008 and 2009 the regional reasons diverged significantly. In 2008, when the new fertilizer subsidy voucher program was first implemented, inability to obtain fertilizer to sell became a major issue in the majority of regions. Especially in the Northern, Upper West and Central region, 69 %, 43 % and 56 % of agro-dealers who didn't stock fertilizers reported inability to obtain any for sales as the main reason for not stocking them. Lack of storage space also became a major issue, especially in Greater Accra. In 2009, The problem with being able to obtain fertilizers decreased slightly in some regions (Western, Upper West, Greater Accra and Central), but in some regions the percentage of input dealers unable to sell fertilizer due to their inability to obtain them rose in Ashanti, Northern and Eastern regions. In addition, ineligibility to redeem vouchers prevented 36 % of non-fertilizer agro-dealers from selling them in Greater Accra, 20 % in Brong Ahafo and 15 % in Eastern region.

New Entrants

While we do not have baseline information on the number of agro-dealers in 2007 and 2008, we do have information about the number of new entrants to the sector in 2008 and 2009 that were still in existence in 2009. In 2008, 357 agro-dealerships were established and remained in operation in Ghana which is 18 % increase from the 1978 enterprises that existed in 2007 (and are still in operation today). In 2009, 481 new agricultural input enterprises were established which is a 21 % increase from the 2008 reported numbers. It is important to note, that given that we do not have information on the number of enterprises that exited the market in 2007 and 2008, we can only make comparisons with enterprises which are still in existence today.

Figure 6: Number of agricultural input enterprises (of those existing in 2009) established in each year



As seen in Figure 6, the new entrants' numbers differed significantly across regions and across the two years 2008 and 2009. Ashanti saw 213 new agro-dealers entering the market in the 2 year period, followed by Brong-Ahafo with 141 entrants and Western region with 109 new entrants. The lowest number of entrants was in Greater Accra which only has 14 new agro-dealers entering the agricultural input market in 2008 and 2009 time period.

When comparing the new entrants and the older enterprise in terms of product structure (Tables 12 and 13), very few differences emerge in terms of percentage of new and old enterprises selling chemicals. 92 % of new entrants and 91 % of older enterprises report selling chemicals in 2009. This trend is very consistent even at the regional level, with the exception of Upper West where lower percentage of new entrants 73 % reports selling chemicals, compared to 86 % of pre-2008 enterprises. Animal feed sales also show lack of significant divergence when comparing both groups.

Table 12: % of new entrants (2008/2009) selling agricultural inputs in 2009

	2008/2009 entrants - % selling .. In 2009				
	Fertilizers	Chemicals	Improved Seeds	Animal Feed	Tools
Ashanti	72%	98%	46%	0%	47%
Brong - Ahafo	76%	95%	50%	0%	73%
Central	93%	98%	76%	10%	88%
Eastern	80%	100%	74%	5%	68%

Greater Accra	57%	93%	79%	7%	86%
Northern	36%	91%	29%	1%	31%
Upper East	98%	33%	31%	2%	17%
Upper West	91%	73%	64%	0%	36%
Volta	75%	95%	50%	5%	60%
Western	70%	99%	55%	2%	79%
Total	72%	92%	51%	2%	58%

For sales of improved seeds, lower percentage of new entrants is selling improved seeds compared to older enterprises (51 % vs. 64 %). This trend is consistent across regions, with the exception of Greater Accra and Upper West where both groups contain the same percentage of improved seed sellers.

Table 13: % of pre-2008 enterprises selling agricultural inputs in 2009

	pre-2008 enterprises - % selling ... in 2009				
	Fertilizers	Chemicals	Improved Seeds	Animal Feed	Tools
Ashanti	82%	98%	64%	2%	75%
Brong - Ahafo	83%	94%	67%	1%	79%
Central	91%	100%	80%	8%	92%
Eastern	86%	98%	83%	7%	79%
Greater Accra	77%	96%	79%	21%	75%
Northern	71%	90%	44%	0%	53%
Upper East	98%	37%	30%	2%	23%
Upper West	71%	86%	59%	7%	53%
Volta	75%	92%	75%	15%	77%
Western	78%	94%	68%	3%	83%
Total	82%	91%	64%	4%	71%

Fertilizer markets show the largest divergence between these two groups; with the longer running enterprises showing higher likelihood of selling fertilizers. 82 % of pre-2008 enterprises and 72 % of new entrants report selling fertilizers in 2009.

However, there is a large regional variation in the percentages of new enterprises stocking fertilizers. In some regions, including Central and Upper West regions, new entrants were more likely to be selling fertilizers compared to agro-dealers established before 2008. For several regions, including Volta and Upper East, the percentage of new entrants selling fertilizers was very consistent with the percentage of pre-2008 dealers. Greater Accra and Northern regions show largest disparities between the new entrants and the old agro-dealerships. The Northern state shows the largest disparity with only 36 % of new entrants selling fertilizers compared to 72 % of pre-existing agricultural input dealers.

6. Fertilizer subsidy program of 2008 and 2009 and influence on the sector

In 2008, Ghana government decided to introduce a voucher based fertilizer subsidy program to help the population cope with enormous rise in food, energy and fertilizer prices in the global and domestic markets.

Program design and actual implementation of Ghana's 2008 fertilizer subsidy

On July 2, 2008, the Minister for Food and Agriculture, held a press briefing at which he announced that there would be temporary country-wide subsidy on NPK 15:15:15, NPK 23:10:05, sulphate of ammonia, and urea from July 4 to December 31, 2008. Farmers were to receive the subsidy in the form of fertilizer-specific and region-specific vouchers distributed by agricultural extension agents (AEAs). Ordinarily fertilizer prices are set by fertilizer retailers but as part of the subsidy program, the government and the private fertilizer importers negotiated the price per 50kg bag in each district capital.¹ The vouchers had face values of approximately 50% of these negotiated prices. A voucher could be used towards the purchase of the relevant fertilizer from any retailer in the region of issue that was willing to accept it.² The retailer then passed on the redeemed vouchers to an importer (in practice, one with whom they were contracted). The importer in turn was to transmit an invoice for the value of vouchers to the Ministry of Food and Agriculture (MoFA) and receive payment within a week. (Banful, 2010)

The subsidy level was chosen with two objectives: 1) to return the price farmers paid for fertilizer to the levels prevailing in July 2007, and 2) to create pan-territorial pricing for fertilizer. There were no specifically articulated goals of the subsidy program and it did not call for targeting of the voucher to farmers based on their income or the crop they cultivated. However, the types of fertilizers subsidized were generally not for use on cocoa, the major cash crop in the country. NPK 15:15:15 was already widely used in the country as a basal dressing fertilizer while urea and sulphate of ammonia were the typical top dressing fertilizers. On the other hand,

¹ The negotiated prices were generally higher than the market prices that had prevailed just before subsidy program by an average of GH¢10.00 and as much as GH¢25.00 per bag. (Banful, 2009)

² There are 10 administrative regions in Ghana.

NPK 23:10:05, a special maize formulation and a product of Yara, was largely unknown to farmers before the subsidy program.

On June 30, 2008, the first batch of vouchers was delivered to the headquarters of the Ministry of Food and Agriculture in Accra. It appears that the regional agricultural directors convened meetings with their district agricultural directors to inform them about the details of the subsidy program at about the same time that the program was announced to the public³. The district agricultural directors in turn convened meetings with the AEAs either just before or on July 4, 2008, to inform them about their roles in the subsidy scheme. AEAs were to distribute vouchers to farmers within their operational areas.⁴ After July 2, the supplemental cash amount to be used with vouchers, that is, the price per 50kg bag for fertilizer purchased with a voucher, was announced widely on radio, and television. It was mainly through these announcements that farmers learnt that a subsidy program had begun and details of the program (Banful, 2010)

Figure 7 shows the timeline of some major events in the fertilizer subsidy program.

Figure 7: Timeline of major events in Ghana's 2008 fertilizer subsidy program

During the peak fertilizer application periods of April, May, June and July, the subsidized fertilizer was not available. The planned total number of vouchers for the duration of the

³ Based on personal conversation with the Regional Agricultural director of the Brong Ahafo region of Ghana, October 23, 2008.

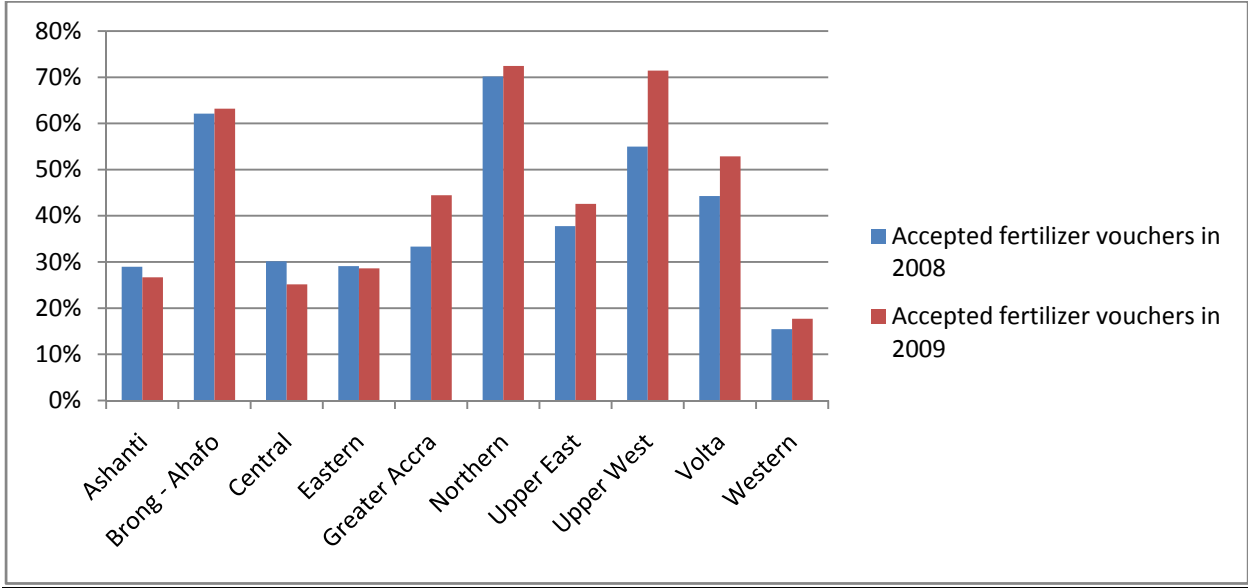
⁴ The MoFA guidelines state that a district should be divided into 32 operational areas each served by 1 agricultural extension agent (AEA). However, most districts do not have enough agents on staff to allow this many operational areas. The boundaries of operational areas are typically not clearly demarcated and are not easily recongized.

program was 600,000 covering 30,000 metric tons of fertilizer, with the total value of subsidy offered amounting to about US\$15 million. However, the total number of vouchers printed was actually 1,140,850. By the end of the planting seasons, less than 50 percent of the vouchers had been redeemed. There was significant regional variation in the voucher redemption rates with regions in northern Ghana achieving higher rates (Banful 2009).

Voucher acceptances rates

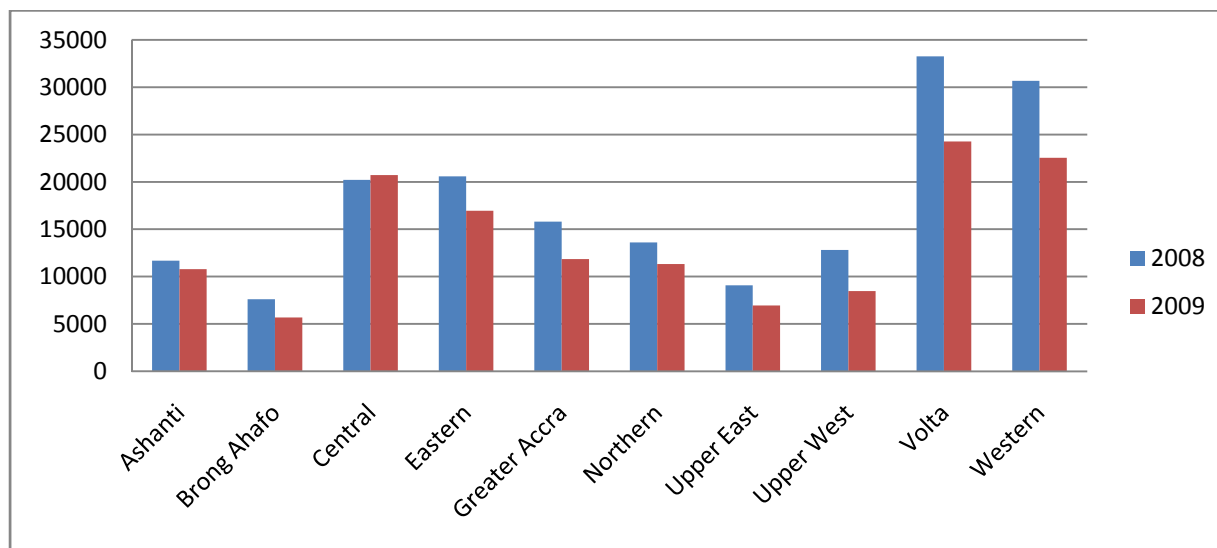
The percentage of fertilizer dealers accepting vouchers in 2008 and 2009 varied significantly across regions, but the country average was 37.5 % in 2008 and 39 % in 2009. Brong Ahafo and Northern regions had the highest percentage of fertilizer dealers accepting vouchers in both years, while Western, Central and Eastern regions had the lowest. In all regions, with the exception of Central region, the percentage of fertilizer dealers accepting vouchers rose from 2008 to 2009. In the Central region, the already low percentage of 30 % in 2008 dropped even lower to 25 % in 2009.

Figure 8: Percentage of fertilizer dealers who accepted vouchers in 2008 and 2009



While the percentage of fertilizer dealers accepting vouchers is important, it does not provide the full picture of farmer’s ability to redeem vouchers since as shown in Figure 1, the density of agro-dealers per million of farmers differs significantly across regions. Figure 9 shows the number of farmers per subsidized fertilizer retailer. Brong Ahafo and Upper East regions had the lower number of farmers per subsidized retailer while Volta and Western regions had the highest number of farmers depending on one fertilizer retailers for voucher redemption.

Figure 9: Farmers per subsidized fertilizer retailer



Consistent with the fact, that higher number of percentage of fertilizer dealers started accepting vouchers in 2009 and that over 20 % of enterprises existing in 2009 were also established that year, the number of farmers per subsidized fertilizer retailer fell in 2009 compared to 2008. The exception is once again Central region which is again consistent with the falling percentage of retailers accepting vouchers in 2009. Volta and Western regions experienced the sharpest drop in the number of farmers per retailer. However, they still remained way above the remaining regions in the number of farmers per retailer.

While the voucher acceptance rates were low in some regions, a high percentage of fertilizer sellers reported selling fertilizers without vouchers. 86 % of fertilizer sellers in 2008 and 84 % in 2009 reported selling fertilizers to customers without vouchers. The only exceptions were Upper West and Northern regions where significantly lower percentage of sellers reported selling fertilizers without vouchers in both years. In addition, the percentage of fertilizer sellers in these regions selling fertilizers without vouchers fell by a large amount between 2008 and 2009 from 62 % to 42 % in Upper West and from 51 % to 39 % in the Northern region. For the remaining regions, the percentage ranged from 78 to 96 % and remained fairly constant through both years.

The majority of agricultural dealers who didn't accept vouchers in both years stipulated not being part of dealer network as the main reason for not accepting them. Only in Greater Accra, fertilizer dealers not accepting vouchers named inability to obtain fertilizers to stock as the key reason for not accepting vouchers. In both Greater Accra and the Northern region, difficulty to redeem the vouchers ranked very high among dealers complaints. The reasons for not accepting

vouchers and the percentage of dealers citing them remained very constant for the majority of non-fertilizer selling dealers across the two years.

Table 14: Reasons for not accepting vouchers in 2008 and 2009

	Reason for not accepting vouchers in 2008			Reason for not accepting vouchers in 2009		
	Not part of dealer network to redeem	Too difficult to redeem	Could not obtain fertilizer to stock	Not part of dealer network to redeem	Too difficult to redeem	Could not obtain fertilizer to stock
Ashanti	91%	5%	3%	89%	7%	4%
Brong - Ahafo	99%	0%	1%	98%	2%	1%
Central	95%	4%	1%	92%	7%	1%
Eastern	75%	13%	13%	75%	15%	10%
Greater Accra	20%	27%	53%	16%	32%	52%
Northern	68%	33%	0%	72%	26%	2%
Upper East	90%	0%	10%	88%	3%	8%
Upper West	96%	0%	4%	100%	0%	0%
Volta	88%	9%	3%	94%	3%	3%
Western	91%	7%	2%	87%	8%	4%

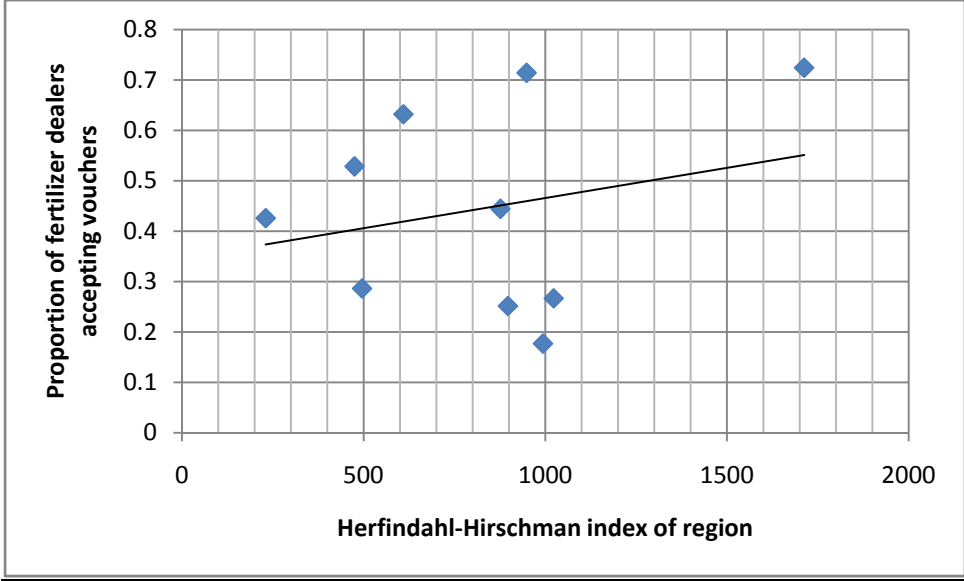
Voucher redemption and received payments

In both years, the majority of voucher accepting dealers report redeeming the vouchers in the same region where they operate. About 30 % of dealers in both years reports submitting vouchers to Yara wholesaler for redemption. About 5 % in 2008 and 3 % in 2009 submitted to Dizengoff wholesaler and slightly less than 10 % submitted to Golden Stork wholesaler for redemption. Large percentage of fertilizer sellers submitted vouchers for redemption to another agricultural input dealer in the area (47 % in 2008 and 52 % in 2009).

44 % of dealers in 2008 and 47 % of dealers in 2009 report receiving fertilizers on credit and thus not receiving payment for submitting the vouchers. 26 % in 2008 and 25 % in 2009 got paid in cash, while 33 % in both years used the value of vouchers towards purchasing additional supplies. 3 % in 2008 and 2 % in 2009 actually reported not receiving payment at all. While non-payment rate was very low in the majority of the regions, in the Central region, 17 % in 2008 and 18 % in 2009 actually reported not receiving payment. In addition, in Ashanti 15 % reported being forced to redeem the vouchers in exchange for other supplies, as opposite to having the option to receive cash payment.

There was a wide range of time frames within which dealers received payment for submitted vouchers. 59 % of dealers reported immediate payment in 2008 and 60% reported immediate payment in 2009. On the other hand, 8 % reported having to wait several weeks in 2008 and 6 % in 2009. Several days were also a frequently quoted time period with 15 % of dealers in both periods reporting is as payment time frame. Brong Ahafo had the fastest repayment with 70 % and 71 % of dealers in 2008 and 2009 reporting receiving immediate payment. On the other hand, only 36 % of agro-dealers in Upper West region received immediate payment. Central region and Greater Accra reported highest non-repayment rates with 20 % of agro-dealers reporting never receiving payment for vouchers redemption.

When asked to compare the ease of obtaining fertilizers in 2008 and 2009 compared to previous years, agro-dealers perceived 2009 to be slightly worse than 2008. 24.9 % of agro-dealers perceived obtaining fertilizers in 2009 harder than in 2008, compared to 20 % of dealers in 2008 comparing to 2007. In addition, smaller percentage (28 %) reported the situation improving in 2009, compared to 30 % reporting improvement in 2008. 49 % in 2009 and 48 % in 2008 reported the situation didn't change from previous years. The regions in the North of the country complained the most about the situation becoming worse. 62 % of agro-dealers in Northern region, 42 % in Upper East and 37 % in Upper West reported that obtaining fertilizers in 2009 became more difficult.



Appendix A: Detailed description of products sold

Appendix Table 1: Chemical products, customers and crops

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Ghana
% that Sells Chemicals	98%	95%	99%	99%	95%	92%	36%	83%	93%	95%	91%
Chemicals											
Insecticide	95%	94%	97%	96%	92%	60%	34%	75%	87%	90%	84%
Pesticides	97%	94%	99%	97%	95%	92%	31%	80%	92%	94%	90%
Other protection products	20%	33%	39%	39%	19%	21%	7%	2%	30%	26%	25%
Customers for Chemicals											
Smallholder farmers	99%	95%	99%	99%	97%	95%	71%	91%	95%	98%	95%
Commercial/large scale farmers	44%	19%	29%	23%	60%	60%	15%	26%	29%	15%	31%
Other Agro-Input Dealers	20%	7%	13%	18%	42%	32%	17%	16%	23%	7%	17%
NGOs or special projects	2%	1%	9%	4%	18%	8%	2%	10%	5%	2%	4%
Other	1%	9%	10%	2%	2%	15%	33%	9%	9%	4%	8%
Crop grown with chemicals											
Cocoa	54%	27%	67%	34%	5%	0%	0%	0%	7%	85%	40%
Maize	90%	84%	95%	93%	80%	99%	81%	99%	93%	73%	88%
Cassava	54%	49%	71%	53%	17%	41%	0%	11%	61%	38%	47%
Rice	20%	9%	10%	6%	17%	80%	74%	82%	27%	7%	24%
Millet or sorghum	15%	5%	1%	1%	5%	54%	18%	78%	12%	0%	15%

Oil palm	19%	10%	38%	27%	2%	0%	0%	0%	12%	18%	16%
Pineapple, orange or banana	26%	17%	53%	19%	25%	0%	1%	0%	9%	8%	18%
Tomatoes, garden egg, pepper, onion or okro	89%	87%	96%	78%	95%	39%	99%	70%	87%	85%	82%
Cabbage, lettuce, carrot	51%	49%	85%	55%	73%	6%	71%	38%	34%	31%	46%
Other	10%	27%	32%	7%	8%	18%	0%	9%	7%	5%	13%

Appendix Table 2: Fertilizer products, customers and crops

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Ghana
% that Sells Fertilizers	83%	85%	95%	88%	85%	66%	99%	82%	79%	83%	84%
Fertilizers											
NPK 15-15-15/other NPK	80%	83%	95%	86%	84%	66%	97%	80%	77%	81%	82%
Sulphate of ammonia	78%	82%	89%	82%	74%	65%	93%	78%	76%	75%	79%
Urea	44%	53%	47%	51%	68%	39%	91%	29%	50%	15%	45%
Muriate of potash/other	6%	2%	9%	2%	8%	0%	2%	2%	4%	1%	4%
Potassium nitrate	5%	3%	13%	9%	32%	1%	8%	4%	8%	1%	6%
Mangesium sulphate	2%	2%	10%	5%	15%	1%	3%	0%	5%	1%	3%
Customer for fertilizers											
Smallholder farmers	88%	87%	98%	92%	90%	78%	99%	83%	85%	87%	88%
Commercial/large scale farmers	40%	14%	26%	20%	50%	50%	18%	27%	26%	11%	27%
Other Agro-Input Dealears	16%	7%	14%	15%	34%	24%	31%	14%	16%	4%	15%

NGOs or special projects	1%	1%	7%	4%	13%	8%	3%	11%	6%	1%	3%
Other	12%	18%	11%	9%	11%	33%	11%	17%	18%	14%	15%
Crop grown with fertilizers											
Cocoa	51%	27%	64%	29%	4%	0%	0%	3%	10%	76%	36%
Maize	84%	87%	91%	89%	94%	100%	97%	96%	95%	70%	87%
Cassava	44%	47%	70%	47%	11%	24%	0%	20%	46%	35%	39%
Rice	18%	8%	9%	5%	13%	91%	86%	72%	25%	6%	27%
Millet or sorghum	14%	6%	1%	1%	2%	64%	30%	88%	8%	0%	16%
Oil palm	19%	8%	40%	27%	2%	0%	0%	0%	8%	15%	15%
Pineapple, orange or banana	23%	18%	52%	21%	28%	1%	3%	1%	10%	9%	17%
Tomatoes, garden egg, pepper, onion or okro	92%	88%	98%	83%	96%	48%	98%	71%	92%	90%	87%
Cabbage, lettuce, carrot	52%	50%	89%	60%	74%	9%	52%	32%	34%	36%	49%
Other	4%	27%	28%	4%	2%	5%	1%	3%	6%	2%	9%

Appendix Table 3: Improved Seeds, Animal Feed and Tools

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Ghana
Improved Seeds											
% that Sells Improved Seeds	59%	62%	79%	80%	79%	45%	30%	60%	70%	65%	66%
Maize	52%	52%	75%	75%	68%	41%	21%	58%	66%	54%	53%
Rice	1%	0%	1%	0%	0%	9%	9%	12%	6%	1%	3%

Millet, sorghum or cowpea	7%	4%	7%	7%	23%	9%	8%	33%	13%	8%	8%
Soy bean	10%	5%	16%	1%	3%	12%	11%	17%	7%	10%	9%
Groundnut	2%	1%	3%	0%	8%	3%	1%	9%	5%	1%	2%
Garden eggs, onion or okro	27%	23%	54%	39%	69%	12%	12%	18%	35%	39%	29%
Tomatoes	25%	32%	49%	32%	69%	18%	25%	22%	43%	25%	29%
Pepper	23%	36%	58%	39%	68%	8%	19%	22%	40%	29%	29%
Cucumber, cabbage, lettuce ..	21%	25%	47%	38%	76%	14%	21%	15%	33%	15%	25%
Tools and Equipment											
% that Sells/Rents Tools and Equip.	68%	77%	91%	75%	77%	54%	21%	49%	75%	82%	67%
Hoe	19%	22%	34%	17%	21%	15%	7%	20%	28%	21%	19%
Cutlass	43%	41%	71%	47%	35%	21%	12%	30%	57%	49%	41%
Machet	17%	16%	48%	20%	21%	5%	4%	4%	12%	26%	17%
Sell knap sack or sprayer	42%	59%	80%	64%	66%	44%	14%	43%	64%	71%	52%
Rent knap sack or sprayer	16%	17%	27%	20%	21%	13%	4%	7%	12%	4%	14%
Mask	32%	43%	74%	48%	71%	27%	8%	23%	46%	37%	37%
Gloves	32%	40%	70%	53%	69%	26%	10%	23%	49%	32%	36%
Other	8%	22%	22%	18%	10%	13%	6%	1%	12%	16%	13%
Animal Feed											
% that Sell Animal Feed	1%	1%	9%	6%	18%	1%	2%	5%	13%	3%	3%
Poultry	1%	0%	7%	6%	15%	0%	0%	3%	12%	3%	3%
Sheep	0%	0%	1%	0%	10%	0%	1%	1%	3%	1%	1%
Cattle	0%	0%	0%	0%	5%	0%	2%	1%	2%	0%	0%

Pigs	0%	0%	4%	1%	15%	0%	0%	2%	4%	1%	1%
Goats	0%	0%	2%	0%	10%	0%	2%	1%	3%	1%	1%
Other	0%	1%	0%	0%	5%	1%	0%	0%	1%	0%	0%

Appendix B: Sources of financing and credit information

Appendix Table 4: Sources of startup capital and financing for current operations

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Bank Account	80%	84%	93%	84%	87%	51%	55%	76%	85%	80%
Source of startup capital										
Personal resources	93%	91%	86%	86%	87%	95%	92%	76%	89%	87%
Family	8%	10%	4%	6%	10%	7%	12%	21%	10%	9%
Friends	1%	3%	2%	5%	0%	2%	4%	3%	4%	2%
Banks	5%	6%	13%	12%	8%	2%	6%	4%	16%	7%
Microfinance institutions	1%	1%	3%	1%	2%	0%	3%	1%	2%	1%
Coops/Associations	0%	1%	0%	2%	0%	0%	0%	1%	1%	1%
Other sources	2%	1%	4%	4%	3%	0%	2%	7%	2%	7%
Amount of start-up capital	1575	973	1774	1285	3533	2408	832	912	916	1053
Sources of financing current operations										
Profits from this business	60%	97%	93%	73%	97%	96%	83%	78%	92%	93%
Personal resources	87%	86%	45%	73%	66%	93%	80%	75%	73%	78%
Family	3%	5%	2%	3%	5%	4%	9%	10%	3%	4%

Friends	1%	0%	1%	2%	2%	1%	1%	4%	4%	1%
Banks	7%	7%	10%	11%	13%	4%	3%	7%	15%	7%
Microfinance institutions	2%	0%	6%	1%	8%	0%	3%	1%	1%	1%
Coops/Associations	1%	0%	0%	2%	0%	1%	0%	1%	1%	1%
Other sources	2%	2%	3%	11%	0%	0%	1%	5%	5%	12%

Appendix Table 5: Credit information

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
% of stores that sell on credit	64%	64%	60%	62%	37%	66%	71%	77%	72%	53%
Type of product sold on credit										
Fertilizer	45%	45%	34%	43%	31%	35%	70%	59%	42%	34%
Insecticides	60%	59%	45%	56%	35%	40%	20%	54%	52%	44%
Weedicides	61%	60%	48%	56%	37%	59%	19%	54%	59%	47%
Tools	18%	19%	27%	20%	11%	16%	7%	26%	29%	17%
Animal feed	0%	0%	1%	2%	3%	0%	0%	1%	5%	1%
Other agriculture related goods	1%	5%	16%	3%	6%	7%	1%	2%	12%	4%
% of stores that purchase on credit from their most important supplier										
No credit	78%	58%	85%	61%	60%	60%	39%	41%	64%	82%
Pesticide	19%	33%	10%	34%	26%	27%	12%	34%	27%	14%

Fertilizer	13%	30%	9%	24%	23%	25%	60%	42%	18%	14%
Improved Seeds	3%	13%	6%	13%	8%	7%	10%	8%	11%	7%
Tools	5%	12%	6%	11%	6%	14%	4%	8%	16%	8%
Animal Feed	0%	0%	1%	1%	2%	0%	0%	0%	2%	0%
Veterinary Products	0%	0%	0%	0%	2%	0%	0%	0%	5%	0%
% of stores that purchase on credit from their second most important supplier										
No credit	48%	40%	79%	49%	66%	48%	19%	26%	64%	54%
Pesticide	8%	14%	5%	17%	21%	16%	4%	22%	15%	7%
Fertilizer	6%	13%	3%	10%	15%	8%	14%	24%	11%	6%
Improved Seeds	1%	4%	2%	4%	6%	3%	2%	5%	7%	4%
Tools	3%	6%	5%	5%	8%	5%	1%	7%	11%	4%
Animal Feed	0%	0%	1%	0%	2%	0%	0%	0%	2%	1%
Veterinary Products	0%	0%	0%	0%	2%	0%	0%	0%	4%	0%

Appendix C: Challenges faced by agricultural input dealers

Appendix Table 6: Top challenges to business operation and top three challenges to business operation

Top Challenge to Running Business	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Low Customer Demand for Items for Sale	16%	10%	10%	15%	6%	8%	19%	5%	25%	17%
Lack of Reliable Suppliers	4%	5%	4%	4%	3%	13%	3%	15%	6%	5%

Lack of Capital	49%	65%	55%	55%	76%	53%	65%	59%	56%	46%
High Cost of Transporting Products	10%	7%	14%	8%	5%	16%	6%	12%	5%	13%
Lack of Technical Knowledge About Product	3%	1%	5%	5%	0%	3%	2%	2%	1%	1%
Lack of Adequate and Safe Storage Facilities	3%	1%	3%	2%	6%	5%	2%	5%	1%	2%
Low Quality of Products/Expiry of Product	1%	1%	2%	1%	0%	0%	0%	1%	0%	1%
Other	9%	8%	6%	8%	3%	2%	3%	0%	6%	14%
Perceive as Challenge to Running Business (Any Ranking)	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Low Customer Demand for Items for Sale	37%	19%	30%	35%	32%	35%	41%	14%	46%	27%
Lack of Reliable Suppliers	17%	15%	10%	12%	27%	39%	29%	43%	16%	17%
Lack of Capital	73%	89%	75%	76%	82%	86%	93%	93%	78%	67%
High Cost of Transporting Products	50%	43%	53%	34%	58%	51%	40%	78%	43%	50%
Lack of Technical Knowledge About Product	13%	15%	16%	16%	8%	27%	15%	26%	12%	17%
Lack of Adequate and Safe Storage Facilities	16%	14%	20%	15%	34%	25%	21%	34%	15%	17%
Low Quality of Products/Expiry of Product	6%	5%	6%	7%	5%	3%	3%	7%	7%	4%
Other	37%	41%	54%	33%	11%	9%	35%	2%	37%	34%

Appendix D: Details of type of training and products sold by those who receive training

Appendix Table 7: Training timing and content

	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Ghana
Formal training received											
Less than 2 years ago	64%	69%	80%	55%	63%	34%	18%	63%	62%	51%	56%
More than 2 years but less than 5	4%	3%	7%	9%	13%	7%	3%	3%	6%	9%	6%
More than 5 years ago	1%	0%	1%	1%	6%	3%	4%	2%	2%	1%	1%
Never received formal training	31%	28%	12%	36%	18%	55%	75%	32%	30%	39%	36%
Content of training if received one											
Proper application/recommended dose of chemicals or fertilizers	94%	94%	98%	94%	86%	96%	96%	94%	86%	93%	94%
Demonstrating product use and safe handling to customers	79%	91%	92%	82%	65%	77%	91%	86%	60%	92%	83%
Specific products that resolve specific issues farmers complain of	59%	77%	65%	47%	45%	70%	53%	38%	38%	65%	60%
Safe handling and storage of products while in your store	79%	91%	84%	78%	84%	76%	85%	70%	79%	82%	82%
General business management	79%	55%	64%	50%	57%	43%	43%	35%	64%	26%	57%
Other	12%	29%	40%	10%	14%	21%	26%	3%	9%	4%	16%

Appendix Table 8: Training timing by type of dealer and product sold

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Ghana
Formal training received if Stockist											
Less than 2 years ago	71%	71%	81%	59%	63%	58%	36%	74%	66%	54%	66%
More than 2 years but less than 5	4%	3%	7%	9%	11%	7%	11%	2%	6%	10%	6%
More than 5 years ago	1%	0%	1%	1%	7%	4%	13%	4%	2%	1%	2%
Never received formal training	23%	25%	11%	31%	19%	31%	40%	21%	26%	35%	26%
Formal training received if Wholesaler											
Less than 2 years ago	56%	88%	80%	53%	71%	10%	29%	55%	38%	67%	40%
More than 2 years but less than 5	6%	0%	0%	12%	14%	8%	3%	7%	0%	11%	6%
More than 5 years ago	2%	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%
Never received formal training	37%	12%	20%	35%	14%	79%	68%	38%	63%	22%	53%
Received training if sells Chemicals											
Less than 2 years ago	63%	69%	80%	55%	64%	33%	29%	66%	65%	52%	61%
More than 2 years but less than 5	4%	3%	7%	9%	12%	8%	6%	1%	6%	10%	6%
More than 5 years ago	1%	0%	1%	1%	7%	3%	10%	3%	1%	1%	2%
Never received formal training	31%	28%	12%	36%	17%	56%	55%	30%	28%	37%	32%
Received training if sells Fertilizers											
Less than 2 years ago	68%	75%	81%	60%	62%	48%	17%	64%	74%	56%	61%
More than 2 years but less than 5	5%	2%	6%	7%	13%	7%	3%	4%	3%	8%	5%
More than 5 years ago	1%	0%	1%	1%	7%	3%	4%	3%	0%	1%	1%

Never received formal training	27%	22%	13%	32%	18%	42%	76%	29%	23%	35%	32%
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Appendix Table 9: Training content by type of dealer and products sold

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
% of chemicals sellers who										
Have training in Proper dosage	95%	96%	98%	94%	88%	96%	100%	92%	90%	93%
Have training in Demonstrating Products use	80%	93%	92%	82%	65%	78%	91%	87%	63%	93%
Have training in Safe handling and storage	79%	93%	84%	79%	86%	75%	86%	74%	81%	82%
% of fertilizers sellers who										
Have training in Proper dosage	95%	96%	99%	94%	86%	96%	100%	92%	91%	93%
Have training in Demonstrating Products use	80%	93%	93%	83%	59%	75%	92%	86%	57%	92%
Have training in Safe handling and storage	78%	93%	86%	78%	81%	79%	84%	72%	83%	83%
% of chem. sellers who break up bags of chemicals and ..										
Have training in Proper dosage	93%	88%	98%	92%	75%	97%	100%	89%	88%	91%
Have training in Demonstrating Products use	86%	76%	90%	78%	63%	84%	92%	94%	67%	96%
Have training in Safe handling and storage	76%	88%	82%	73%	88%	76%	92%	78%	75%	81%
% of fert. sellers who break up bags of fertilizers and ..										
Have training in Proper dosage	95%	96%	98%	93%	85%	97%	100%	95%	90%	94%
Have training in Demonstrating Products use	79%	93%	92%	83%	58%	81%	91%	95%	57%	93%
Have training in Safe handling and storage	77%	93%	85%	78%	79%	83%	86%	71%	84%	85%

Appendix E: Voucher program supplementary

Appendix Table 10: Voucher submitted to which retailer 2008, 2009

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
2008 vouchers submitted to:										
Yara wholesaler	10%	27%	27%	27%	67%	49%	53%	39%	26%	28%
Dizengoff wholesaler	5%	3%	5%	11%	27%	2%	1%	3%	4%	8%
Golden stork wholesaler	6%	15%	5%	18%	27%	7%	0%	12%	11%	0%
Another agro input retailer	63%	62%	27%	25%	7%	33%	44%	55%	48%	33%
Other	24%	12%	54%	42%	27%	17%	1%	0%	22%	47%
2009 vouchers submitted to:										
Yara wholesaler	12%	23%	33%	33%	.	43%	48%	42%	.	35%
Dizengoff wholesaler	5%	2%	5%	13%	.	4%	0%	0%	.	2%
Golden stork wholesaler	5%	13%	8%	33%	.	9%	1%	8%	.	0%
Another agro input retailer	63%	65%	28%	33%	.	35%	47%	54%	.	37%
Other	25%	11%	45%	13%	.	19%	6%	4%	.	35%

Appendix Table 11: Payments for vouchers 2008, 2009

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Payment for vouchers in 2008										
Fert received on credit - no payment	28%	75%	39%	24%	13%	30%	47%	30%	52%	53%
Got cash	20%	9%	32%	22%	53%	37%	43%	52%	30%	8%

Value of vouchers used towards cost of supplies	47%	23%	15%	53%	7%	43%	16%	36%	30%	36%
Forced to use the vouchers towards cost of supplies	17%	0%	5%	4%	27%	1%	1%	3%	4%	0%
Did not receive payment	3%	0%	17%	5%	7%	0%	0%	0%	0%	6%
Payment for vouchers in 2009										
Fert received on credit - no payment	29%	78%	53%	7%	.	26%	49%	24%	.	51%
Got cash	21%	9%	20%	0%	.	38%	48%	52%	.	4%
Value of vouchers used towards cost of supplies	46%	21%	13%	93%	.	43%	17%	40%	.	41%
Forced to use the vouchers towards cost of supplies	15%	0%	5%	0%	.	0%	1%	2%	.	0%
Did not receive payment	1%	0%	18%	0%	.	3%	0%	0%	.	6%

Appendix Table 12: Timing of payments for vouchers submitted and ease of obtaining fertilizer 2008, 2009

	Ashanti	Brong - Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Payment after submitting vouchers in 2008 received										
Immediately	47%	70%	61%	55%	47%	61%	74%	36%	63%	61%
One Day	8%	11%	0%	11%	7%	2%	7%	12%	4%	3%
Several Days	26%	9%	12%	7%	0%	4%	12%	48%	11%	17%
One Week	4%	2%	7%	7%	13%	20%	6%	3%	0%	14%
Several Weeks	12%	4%	2%	16%	20%	6%	1%	0%	22%	6%
Never	4%	3%	17%	4%	13%	6%	0%	0%	0%	0%

Ease of obtaining fert in 2008 compared to previous years										
Same	66%	51%	56%	41%	29%	7%	35%	20%	51%	63%
Easier	27%	35%	20%	36%	42%	39%	21%	48%	36%	22%
More difficult	7%	14%	24%	23%	29%	54%	44%	32%	13%	15%
Payment after submitting vouchers in 2009 received										
Immediately	48%	71%	63%	67%	.	56%	73%	36%	.	69%
One Day	8%	11%	3%	0%	.	1%	4%	22%	.	2%
Several Days	25%	9%	8%	7%	.	4%	11%	38%	.	12%
One Week	5%	3%	5%	0%	.	22%	8%	2%	.	4%
Several Weeks	11%	3%	3%	27%	.	8%	3%	2%	.	8%
Never	4%	3%	20%	0%	.	9%	0%	0%	.	4%
Ease of obtaining fert in 2009 compared to previous years										
Same	66%	47%	55%	52%	.	5%	34%	14%	.	51%
Easier	24%	30%	25%	24%	.	33%	23%	49%	.	28%
More difficult	10%	23%	20%	24%	.	62%	42%	37%	.	21%