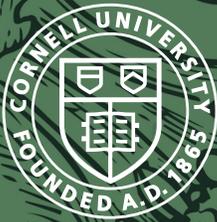


OCTOBER 2017

E.B 2017-14



CASE STUDIES OF SUPERMARKETS AND
FOOD SUPPLY CHAINS IN LOW-INCOME
AREAS OF THE NORTHEAST:

PITTSBURGH STORE, PENNSYLVANIA

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This research was supported by USDA-NIFA AFRI Grant #2011-68004-30057:
Enhancing Food Security in the Northeast through Regional Food Systems,
a joint project of 11 institutions led by the Northeast Regional Center for Rural Development.



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Case Studies of Supermarkets and Food Supply Chains in Low-Income Areas of the Northeast: Pittsburgh Store, Pennsylvania. By Kristen S. Park^{1,4}, Miguel Gómez², Kate Clancy³, Extension Bulletin 2017-14. Charles H. Dyson School and Applied Economics and Management, College of Agriculture and Life Sciences, Cornell University, Ithaca, NY 14853.

Acknowledgements

This case study was conducted as part of a U.S. Department of Agriculture funded project titled “Enhancing Food Security in the Northeast through Regional Food Systems” (EFSNE). This seven-year research, education, and outreach project examines food production, distribution, and consumption in the Northeast U.S. (defined as 12 states from Maine to West Virginia and the District of Columbia) with the goal of understanding the potential for regional food systems to address food security challenges in the region. The project includes collaborators from 11 different universities and other institutions. As part of the project’s distribution, consumption, and outreach objectives, five urban and four rural study locations in the Northeast have been identified for community- and store-level analysis.

The authors would like to acknowledge the enormous contributions of the store participants. In addition we would like to thank the EFSNE project investigators for their support to the case studies and to Elaine Hill, Bobbie Smith, III, Irin Nishi, Susan Parker, Derek Simmonds, and Dan Kane for their interviews and data collection efforts.

This work was supported by USDA grant #2011-68004-30057

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Pittsburgh Store, Pennsylvania

Introduction

As part of a collection of EFSNE projects that examined distribution systems, 11 store case studies were conducted to gain a better understanding of stores serving low-income areas and their role in the regional food system of the Northeast. The cases are an effort to record important characteristics of the participating stores and their supply chain partners. This case describes a supermarket and with it the supply chains of two of the eight foods in the EFSNE project's market basket, which served as a focal point for many of its research activities.

Case study interviews were conducted from 2014 to 2015.

Fictitious names are used to maintain confidentiality of the case study participants.

Place: Pittsburgh, PA

This case describes one retail grocery store in a neighborhood of Pittsburgh, Pennsylvania and two of its product supply chains.¹ The population of the zip code-defined neighborhood that this store serves is 23,092 (Table 1). The median household income is \$51,308, slightly less than the median household income for Pennsylvania, \$53,115. The neighborhood has a relatively low poverty rate of 10.5 percent.

The U.S. Census Bureau reports five grocery stores, excluding convenience stores, and five convenience stores in the neighborhood. It does not have any supercenters or wholesale clubs. The concentration of food retailers per 10,000 persons is included in Table 1 to illustrate how this compares to the county and state metrics.

Supermarkets and other grocery stores sell a variety of foods, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Supermarkets are traditionally defined in the food retail industry as large grocery stores having \$2 million or more in annual sales. Convenience stores or food marts (except those with fuel pumps) primarily engage in retailing a limited line of goods that generally includes milk, bread, soda, and snacks.

¹ The neighborhood is defined as the zip code that contains the store.

TABLE 1: Demographic and Food Environment Statistics for Pittsburgh Store

	Neighborhood zip code	Allegheny County	Pennsylvania
DEMOGRAPHICS			
<i>Population and Age</i>			
Population ¹	23,092	1,229,172	12,758,729
Median age ¹	38.9	41	40.4
Less than 5 years of age ^{a,1}	6.0%	5.2%	5.6%
Average household size ¹	2.19	2.26	2.49
<i>Education</i>			
High school degree or higher ^{a,1}	94.2%	93.4%	89.0%
Bachelor's degree or higher ^{a,1}	37.5%	36.9%	28.1%
<i>Race and Ethnicity</i>			
African American or Black ^{a,b,1}	8.5%	14.5%	12.1%
Hispanic ^{a,c,1}	4.9%	1.7%	6.1%
<i>Poverty and Program Participation</i>			
Poverty rate ^{a,1}	10.5%	12.9%	13.5%
Food insecurity rate ^{a,2}	14.4%	13.8%	13.0%
Share SNAP recipients ^{a,d,1,3}	N/A ^e	13.0%	14.1%
<i>Income</i>			
Median household income ¹	\$51,308	\$52,390	\$53,115
FOOD ENVIRONMENT			
Grocery stores ^{f,4}	2.17	1.87	2.13
Convenience stores ^{f,4}	2.17	3.67	3.23
Warehouse clubs and supercenters ^{f,4}	0	0.11	0.12

Notes:

^a Percentage of entire population.

^b Alone or in combination with other races.

^c Of any race.

^d Calculated by dividing the number of SNAP recipients by the population.

^e Data not available at the zip code level.

^f Number per 10,000 people.

Sources:

¹ American Community Survey 5-Year Estimate, 2010 - 2014, copied from http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml on April 27, 2016.

² Food insecurity, 2013, FeedingAmerica.org, downloaded from <http://www.feedingamerica.org/hunger-in-america/our-research/map-the-meal-gap/data-by-county-in-each-state.html> on April 27, 2016.

³ Small Area Income and Poverty Estimate, July 2013, downloaded from <http://www.census.gov/did/www/saipe/data/model/tables.html> on April 27, 2016.

⁴ County Business Patterns Database, 2013, downloaded from https://www.census.gov/econ/cbp/download/13_data/ on April 29, 2016. Currently online at <https://www.census.gov/data/datasets/2013/econ/cbp/2013-cbp.html>.

Pittsburgh Store

Pittsburgh Store is an independent store. The owners have three additional smaller retail stores in the area as well as a hot truck. This store was purchased just five months ago but had been operating under two different owners for the three years prior.²

The store is about 5,000 square feet plus 2,000 square feet dry storage and 3,000 square feet refrigerated and frozen storage. It has 15 full- and 10 part-time employees. It purchases from about 30 different suppliers. This location also serves as a mini-distribution center for two of the other smaller stores and for the hot truck.

The store's average gross margin, the difference between the purchase price and selling price divided by the selling price, is 15-20 percent for items purchased from the store's major grocery wholesaler, Primary Wholesaler. Gross margin is an important measure of the margin available to pay for all operations above and beyond the cost of the product. The 2015 median gross margin for supermarkets reported by the Food Marketing Institute is 28 percent.³

When asked "What external factors impact your ability to be in business in the community?" the store manager could not think of any, "It is working well here."

The owner could not think of any factors that limited his ability to procure regionally produced foods or that limited his ability to sell healthy foods. When asked whether procuring healthy versions of foods was difficult, the owner said the store does not carry many, although they do carry whole-grain breads. He has received some requests for vegetarian options and in response places vegetarian recipes around the store. The store does not sell any organic items.

Market basket items – Cabbage and Frozen Broccoli

The store sells roughly one 45-lb case of cabbage twice per week at a retail price of \$0.69 per pound.

The store's leading frozen broccoli brand in sales is National Brand 1. The store also carries National Brand 2 as well as a Midwest/Southern brand and a private label brand. Frozen broccoli without sauce is by far the leading form of frozen broccoli and is 80-90 percent of frozen broccoli sales. The remaining 10-20 percent is from frozen broccoli with sauce.

“

[The store] also serves as a mini distribution center for two of the other smaller stores and for the hot truck.

”

² The store interview was conducted in 2014. Although this case study is written in present-tense, it is meant to provide a snapshot in time, and the authors make no claims that the data reflect anything other than the store's situation at that time.

³ *The Food Retailing Industry Speaks 2016*. The Food Marketing Institute. Arlington, VA 22202.

Supply Chains

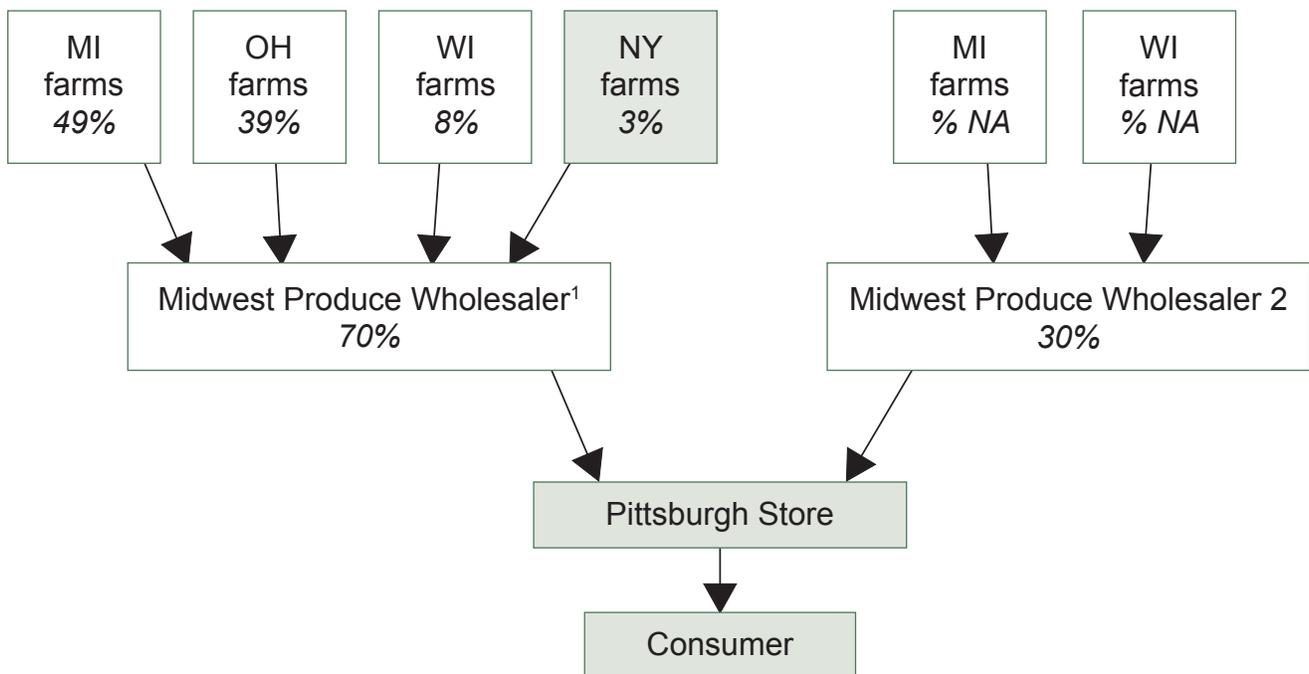
We trace the supply chains of two products, cabbage and frozen broccoli, from the study market basket sold by Pittsburgh Store to determine the sources of these foods and the extent of regional food system participation.

Product 1: Cabbage

Figure 1 depicts the general supply chain for Pittsburgh Store cabbage. Starting at the store and tracing back the supply chain, the boxes upstream indicate the percent of the downstream member's total purchases. Primary Wholesaler engages Midwest Produce Wholesaler, a full-service produce distributor with a distribution center approximately 99 miles from the store, to provide produce to its supermarket customers. Midwest Produce Wholesaler provides 70 percent of Pittsburgh Store's cabbage. Midwest Produce Wholesaler 2, which is not aligned with Primary Wholesaler, provides the remaining 30 percent.

We define a regional supply chain as one where the product is produced, or grown, in the region. Therefore, the supply chain originating in New York (NY) farms is a regional supply chain.

FIGURE 1: Cabbage Supply Chain for Pittsburgh Store



Note: Shaded boxes represent supply chain members located in the Northeast Region. Numbers in boxes represent the percent of the next member's supply.

NA=Not available

¹Midwest Produce Wholesaler supplies Pittsburgh Store on behalf of Primary Wholesaler.

Source: Author's calculations based on case interviews.

Suppliers

Midwest Produce Wholesaler

Midwest Produce Wholesaler is a produce wholesaler headquartered in Indiana. The company has three distribution centers and provides about 70 percent of the cabbage that Pittsburgh Store sells. The company supplies Pittsburgh Store with produce under an agreement with Primary Wholesaler. Pittsburgh Store places orders by phone 2-3 times per week and they are delivered in one day. Deliveries are from a box truck. Midwest Produce Wholesaler does not charge separate delivery costs.

In general, the store is happy with Midwest Produce Wholesaler as a supplier. It is very satisfied with the quality of the products, timeliness of delivery, and trustworthiness and generally satisfied with its product diversity, terms of payment and proximity.

Payment is expected in 30 days. Midwest Produce Wholesaler does offer some services such as shelf resets, specials, and ad pricing.

Midwest Produce Wholesaler provides fresh produce and logistics for the store's primary grocery wholesaler. The produce wholesaler sends produce from its distribution center either to the grocery wholesaler's distribution center or directly to the store on the wholesaler's behalf when the logistics are favorable. In the case of Pittsburgh Store, it direct delivers from the distribution center to the store.

Midwest Produce Wholesaler's cabbage comes from the following:

- MI 49.4% of supplies
- OH 39.6%
- WI 7.9%
- NY 3.2%

The wholesaler requires third-party food safety certification from all of its suppliers. It does not specify which food safety certification; however, if a supplier offers one the wholesaler has not heard about, it will research it to see if it is acceptable.

The wholesaler sells cabbage without any packaging, although it sells some wrapped cabbage that has outer leaves removed and is shrink wrapped with a bar code applied. This product is usually for stores that do not have any scales and want to sell by the pound instead of by the head.

Prices are negotiated from the market prices. Sometimes the wholesaler will pay a little more or a little less depending on the quality of the product and reputation and reliability of the supplier.

“

The produce wholesaler sends produce from its distribution center either to the grocery wholesaler's distribution center or directly to the store on the wholesaler's behalf...

”

Cabbage orders are made by phone. The wholesaler is interested in the fastest and most efficient ordering method which may vary depending on the product and/or the customer. It also depends on the complexity of the order, such as whether it is for a mixed order of various produce items or just one item. The wholesaler generally orders in the morning for pick up the same day, in the afternoon.

The wholesaler manages its transportation using a third-party carrier. Trucking expenses vary by season and generally are 7-8 cents per pound.

Midwest Produce Wholesaler 2

Pittsburgh Store has used Midwest Produce Wholesaler 2 as a supplier for four years. It supplies 30 percent of the store's cabbage. This wholesaler is located on the Chicago International Produce Market and is vertically integrated with family-owned processing and production companies, both of which are located in Mexico.

The store places an order by phone once a week and orders are delivered in one day. It costs about \$2,300 for the truck to transport from Chicago, and cabbage is a small percentage of the load.

The company has been in business for about 20 years and has annual sales of around \$65 million. It has a full house of imported Hispanic produce but also carries other produce items and sources these from anywhere in the U.S.

Cabbage is a very small part of its business, less than 2-4 percent of sales. It has about 2,000 cabbage customers and these customers buy everything else as well. Customers include small groceries, restaurants, retailers, etc. Over 90 percent of its sales are in the Midwest, and it does not sell to the Northeast except for the occasional customer need.

Its cabbage comes in unlabeled boxes without any information or descriptions.

Midwest Produce Wholesaler 2 buys cabbage from anyone with the best prices and quality. It has around 10-20 cabbage suppliers. The wholesaler buys from the grower and usually arranges transportation itself through its trucking brokerage. If the supplier is too far away or is from an area outside of the wholesaler's trucking brokerage, the supplier arranges the transportation.

When asked, "What makes for a good relationship with customers," it indicated consistency. "With consistency, customers have faith in you and your product," the participant reported, "Consistency meets expectations."

Prices are negotiated and payment is expected in 30 days.

Pittsburgh Store is satisfied with Midwest Produce Wholesaler 2 as a supplier, particularly for its product diversity, quality, trustworthiness, and product availability.

“

This wholesaler is located on the Chicago International Produce Market and is vertically integrated with family-owned processing and production companies, both of which are located in Mexico.

”

Regional Comparisons

In this section we examine the store's cabbage supply chains. Pittsburgh Store's cabbage comes almost exclusively from the Midwest with only a very small portion, about two percent, from the Northeast. We examine the supply chains' movement of cabbage from grower-shippers in the Midwest through two different wholesalers.

Table 2 shows the price margin⁴ per pound of cabbage received by each member of the supply chain. In addition, it indicates the percent of total or proportion of the retail price received by each member using the member's price margin. For example, the USDA Market News reports Michigan grower-shippers received on average \$0.22 per pound which is 32.2 percent of the final retail price. The price margin for the produce wholesaler buying from a Michigan grower-shipper was approximately \$0.13 or 19.0 percent of the final retail price. We note that the price margin is what is left to pay for all other business expenses and profits. It is not an indication of profitability.

The price margin received by the retailer was \$0.28 and, in this case, includes the cost of transportation to the store. The store received 41 percent of the retail price on cabbage purchased from Midwest Produce Wholesaler and 37.1 percent on cabbage purchased from the other wholesaler, Midwest Produce Wholesaler 2.

TABLE 2: Allocation of Retail Price in Pittsburgh Store's Cabbage Supply Chains

	Midwest Produce Wholesaler								Midwest Produce Wholesaler 2			
	MI Farms		OH Farms		WI Farms		NY Farms		WI Farms		MI Farms	
	Price margin (\$/lb)	% of retail price	Price margin (\$/lb)	% of retail price	Price margin (\$/lb)	% of retail price	Price margin (\$/lb)	% of retail price	Price margin (\$/lb)	% of retail price	Price margin (\$/lb)	% of retail price
Supply chain segment												
Producer-packer-shipper ¹	0.22	32.2	0.32	46.4	0.24	35.4	0.19	27.5	0.24	35.4	0.22	32.2
Transport	0.05	7.8	0.02	2.8	0.07	10.0	0.04	6.3	0.01	1.5	0.02	3.4
Produce wholesaler	0.13	19.0	0.07	9.9	0.09	13.6	0.17	25.2	0.03	3.8	0.03	5.1
Transportation	-	-	-	-	-	-	-	-	0.15	22.2	0.15	22.2
Retailer	0.28	41.0	0.28	41.0	0.28	41.0	0.28	41.0	0.26	37.1	0.26	37.1
Total Retail Price	0.69	100.0	0.69	100.0	0.69	100.0	0.69	100.0	0.69	100.0	0.69	100.0

Notes: - indicates "not applicable"

¹ USDA, Market News Specialty Crops shipping point prices

Source: Author's calculations based on case interviews and USDA Market News reporting service.

⁴ Price margin is defined here as the sale price minus the purchase price.

Table 3 shows the distance and fuel used to get fresh cabbage from the grower-shipper to the store. Two supply chains are shown, the one originating from a NY grower-shipper through Midwest Produce Wholesaler to the store, which is the regional supply chain, and one originating from a Wisconsin (WI) grower-shipper through Midwest Produce Wholesaler 2 to the store, which is the longest supply chain.

The supply chain from production in Wisconsin consumes less total fuel (71.3 gallons) than does the chain from New York State. Despite this, the fuel efficiency is better in the regional supply chain (0.25 gallons per hundredweight), originating with the NY grower-shipper. This is due to the inefficiency of moving the supplies from Chicago in a straight truck which only holds 15,000 pounds versus a tractor-trailer which can hold up to approximately 40,000 pounds. The fuel used is spread across less product.

TABLE 3: Food Miles and Fuel Use in Pittsburgh Store's Cabbage Supply Chains

Supply chain segment	Food miles	Truck miles ¹	Truck capacity	Fuel use ²	Fuel use per cwt shipped
	<i>number</i>		<i>cwt</i>		<i>gallons</i>
Regional: NY farm to Pittsburgh Store³					
NYS grower-shipper to Midwest Produce Wholesaler 1	314	314	400	52.3	0.13
Produce Wholesaler 1 to Pittsburgh Store	99	197	150	17.9	0.12
All Segments	413	511		70.3	0.25
Non-regional: WI farm to Pittsburgh Store⁴					
WI farms to Midwest Produce Wholesaler 2	74	148	400	24.7	0.06
Midwest Produce Wholesaler 2 to Pittsburgh Store	466	466	150	42.4	0.28
All Segments	540	614		67.0	0.34

¹ Truck miles are equal to food miles when cabbage travels over 150 miles. Trucks on trips longer than 150 miles will return with a backhaul.

² Miles per gallon (mpg) vary by segment. Trailer trucks used for shipping cabbage from WI to the wholesaler have a capacity of 40,000 pounds and obtain 6 mpg; straight trucks used for shipping cabbage from the produce wholesaler 2 to Pittsburgh Store have a capacity of 15,000 pounds and obtain 11 mpg.

³ We use the principal cabbage-producing region of New York which is Niagara County.

⁴ We use the principal cabbage-producing region of Wisconsin which is in southeastern Wisconsin.

Source: Author's calculations based on case based interviews and USDA, Agricultural Marketing Service.

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While the Pittsburgh Store is in the Northeast region as defined by our study, it is on the border of the region and procuring from suppliers in the Midwest makes logistical sense.

”

Prospects for Expansion of Regional Food System: Cabbage

The cabbage supply chains for Pittsburgh Store contain two different wholesalers each with a number of grower-shippers supplying them with cabbage depending on the price opportunity. Yet cabbage sales in the store are very small and cabbage is not a major commodity for any of the intermediary companies.

The Northeast supply chain is a very small part of the cabbage supply chains; however, it would be unfair to say that the store does not procure from states nearby. While the Pittsburgh Store is in the Northeast region as defined by our study, it is on the border of the region and procuring from suppliers in the Midwest makes logistical sense.

To provide an estimate of the value-added activities of each supply chain, we assume that the margin as a percent of retail price is a proxy for the amount of value-added activity produced by each supply chain member. We weight the member price margins (see Table 2) by the proportion of Pittsburgh Store’s cabbages that they provide (see Figure 1) to calculate the extent of total regional participation in the supply chain. Table 4 summarizes the extent of members’ participation in the supply chain as well as the total extent of regional value-added activity in the cabbage supply chains.

The regional supply chain stream that starts with cabbages grown by NY cabbage farms and marketed through Midwest Produce Wholesaler 1 contains only about 1.6 percent of all of the regional value-added activity of all the cabbage supply chains. The NY farms and the store are located in the region, therefore their value-added activities—the farms’ production and shipping activities plus Pittsburgh Store’s retailing value added—are counted as regional value-added activities. Even though this is a regional supply chain, some of the value-added activities accrue to members outside of the region, including Midwest Produce Wholesaler 1 and the transportation it provides to Pittsburgh Store.

The stream that starts with cabbages grown in Michigan (MI) and marketed through Midwest Produce Wholesaler 1 to the store contains 34.3 percent of the total value-added activities of all the supply chains, but only the store’s portion, 14.1 percent, are considered regional activities.

The sum of the regional activities for all chains is 40.3 percent and almost all of it is from the store’s value-added activities.

TABLE 4: Extent of Regional Value-Added Activity in the Pittsburgh Store Cabbage Supply Chain

	Percent of retailer's cabbage supplies	Value-added ¹	Value-added retained by supply chain member	Extent of regional value-added activity ²
Supply chain segment	%	% of retail price	%	%
Regional: NY Farm to Midwest Produce Wholesaler 1 to Pittsburgh Store³				
NY grower-shipper	2.1	27.5	0.6	
Transportation		6.3	0.1	
Midwest Produce Wholesaler 1	70.0	25.2	0.5	
Pittsburgh Store	100.0 ³	41.0	0.9	
All segments	2.1	100.0	2.1	1.6
Non-regional: MI Farm to Midwest Produce Wholesaler 1 to Pittsburgh Store³				
MI grower-shipper	34.3	32.2	11.0	
Transportation		7.8	2.7	
Midwest Produce Wholesaler 1	70.0	19.0	6.5	
Pittsburgh Store	100.0 ³	41.0	14.1	
All segments	34.3	100.0	34.3	14.1
Non-regional: OH Farm to Midwest Produce Wholesaler 1 to Pittsburgh Store³				
OH grower-shipper	27.3	46.4	12.7	
Transportation		2.8	0.8	
Midwest Produce Wholesaler 1	70.0	9.9	2.7	
Pittsburgh Store	100.0 ³	41.0	11.2	
All segments	27.3	100.1	27.3	11.2
Non-regional: WI Farm to Midwest Produce Wholesaler 1 to Pittsburgh Store³				
WI grower-shipper	5.6	35.4	2.0	
Transportation		10.0	0.6	
Midwest Produce Wholesaler 1	70.0	13.6	0.8	
Pittsburgh Store	100.0 ³	41.0	2.3	
All segments	5.6	100.0	5.6	2.3
Non-regional: WI Farm to Midwest Produce Wholesaler 2 to Pittsburgh Store³				
WI grower-shipper	15.0	35.4	5.3	
Transportation		1.5	0.2	
Midwest Produce Wholesaler 2	30.0	3.8	0.6	
Transportation		22.2	3.3	
Pittsburgh Store	100.0 ³	37.1	5.6	
All segments	15.0	100.0	15.0	5.6
Non-regional: MI Farm to Midwest Produce Wholesaler 2 to Pittsburgh Store³				
MI grower-shipper	15.0	32.2	4.8	
Transportation		3.4	0.5	
Midwest Produce Wholesaler 2	30.0	5.1	0.8	
Transportation		22.2	3.3	
Pittsburgh Store	100.0 ³	59.3	5.6	
All segments	15.0	100.0	15.0	5.6
Value-added performed in region				40.3

¹ This column contains the percent margins of retail revenue from Table 2 above.

² This column captures all regional activity in the Northeast within each supply chain (excluding supply chain activity outside of the Northeast).

³ By default, the retailer percent is 100 percent.

Note: Shaded rows indicate supply chain members located in the Northeast.

Source: Authors' calculations based on case interviews.

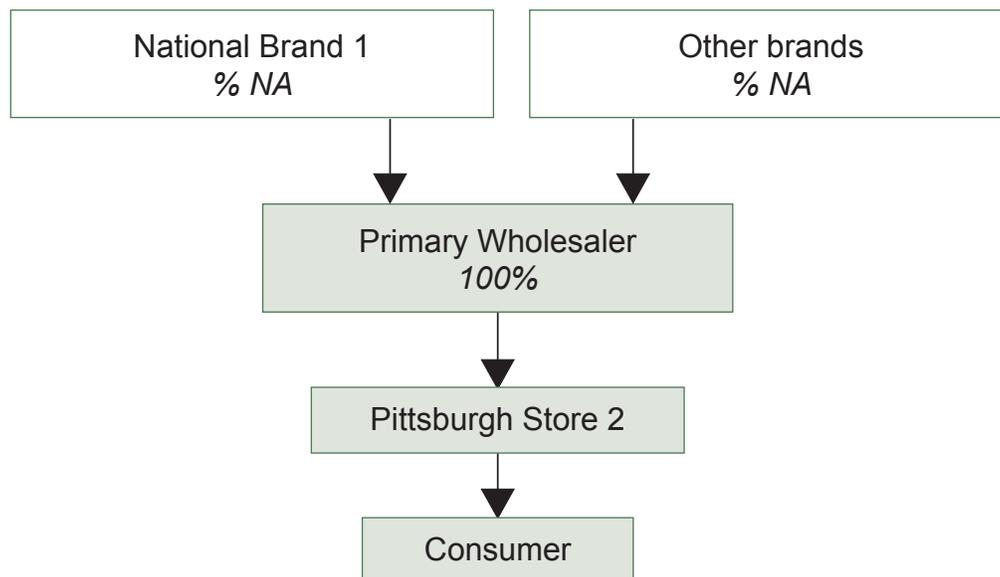
The regional supply chain out of New York is not the closest supply chain. Suppliers from Ohio and Michigan growers are closer to Midwest Produce Wholesaler and likely provide competitive prices, especially after transportation costs are included. In addition, consumers in Pittsburgh are as likely to identify with Ohio farmers as they are with New York farmers, and any efforts to label cabbage by its source would probably not be a competitive advantage for New York growers.

Prospects for expanding supplies from the Northeast region may lie primarily in producers local to the store, including producers in western Pennsylvania. Given the volume of cabbage moving through the store, a few local suppliers with access to storage to keep cabbage for a few months may be able to supply the store with regionally produced cabbage.

Product 2: Frozen Broccoli

Figure 2 depicts the general supply chain for Pittsburgh Store frozen broccoli. Starting at the store and tracing back the supply chain, the boxes upstream indicate the percent of the downstream member's total purchases. Primary Wholesaler supplies 100 percent of the store's frozen broccoli.

FIGURE 2: Frozen Broccoli Supply Chain for Pittsburgh Store, PA



Note: Shaded boxes represent supply chain members located in the Northeast Region. Numbers in boxes represent the percent of the next member's supply.

na=not available

Source: Author's calculations based on case interviews.

Suppliers

Primary Wholesaler supplies 100 percent of the frozen broccoli. Orders from the store are scanned with a handheld scanner and then downloaded through the phone. Orders are placed twice per week and delivery is within 1-2 days. Order size is generally two cases, each with 12 bags for a total of 24 bags per order. Price is set by the wholesaler.

Deliveries are \$20-\$30 for all products from a 52 foot tractor-trailer truck. Frozen broccoli is a very small part of the delivery. Payment is expected within 30 days. The wholesaler provides assistance with pricing, resets, and advertising.

National Brand 1

National Brand 1 frozen broccoli is primarily grown and processed in Mexico. Almost all frozen broccoli is commercially produced and processed overseas. The U.S. imports frozen broccoli primarily from Mexico, Guatemala, Ecuador, and China. Over 80 percent of U.S. processed broccoli, most of which is frozen, is imported.

National Brand 1 is a leading frozen vegetable brand in the U.S. with a market share of 25.7 percent of frozen vegetable retail sales. National Brand 1 has two frozen vegetable processing plants in the U.S. which process other vegetables; however, all of its frozen broccoli is imported, primarily from Mexico and Guatemala.

The brand is still highly dependent on the leading customer retailers. Wal-Mart, including all its divisions, and the rest of National Brand 1's 10 leading customers account for about 60 percent of National Brand 1's sales (Form 10-K, Annual Report). The company reports that private label is a significant competitor.

Regional Comparisons

In this section we examine an international frozen broccoli supply chain. Insufficient data are available to calculate price margins for any supply chain members beyond the store, other than for estimates of transportation. Pittsburgh Store's leading brand of frozen broccoli is grown and processed in Mexico and Guatemala; the product does not originate from any regional broccoli grower.⁵ We examine the supply chain movement of frozen broccoli from Mexico as an example of one of the store's frozen broccoli supply chains.

⁵ Over 95 percent of frozen broccoli sold in the U.S. is imported. The top three countries of origin for frozen broccoli are Mexico, Guatemala, and Ecuador. Source: Foreign Agricultural Service, BICO reports at: <https://apps.fas.usda.gov/GATS/BICORreport.aspx>

TABLE 5: Allocation of Retail Price in Pittsburgh Store’s Frozen Broccoli Supply Chain¹

Supply chain segment	Frozen Broccoli	
	Price margin (\$/lb)	% of retail price
Transport ²	0.01	0.2
Retailer	0.15	5.8
Total Retail Price	2.52	100.0

¹ Frozen broccoli florets shipped from Mexico.

² Delivery from a box truck 4,000 lbs at a cost of \$25/delivery.

Source: Author’s calculations based on case study and expert interviews

Table 6 shows the distance and fuel used to get frozen broccoli from the producer to the retailer. The estimated total fuel used to transport 100 pounds of packaged frozen broccoli from Mexico to Primary Wholesaler via truck is 0.8 gallons. The remaining transportation from Primary Wholesaler to Pittsburgh Store uses an estimated 0.2 gallons per hundredweight. Total fuel use to move a hundredweight of frozen broccoli from Mexico to Pittsburgh Store is estimated as 1.0 gallons per hundredweight.

TABLE 6: Food Miles and Fuel Use in Pittsburgh Store Frozen Broccoli Supply Chain

Supply chain segment	Food miles	Transport miles ¹	Truck capacity	Fuel use ²	Fuel use per cwt shipped
	<i>number</i>		<i>cwt</i>	<i>gallons</i>	
International: Mexico to Pittsburgh Store					
Celaya, Mexico to Primary Wholesaler	1,936	1,936	400	323	0.8
Primary Wholesaler to Pittsburgh Store	441	441	400	74	0.2
All segments	2,377	2,377		396	1.0

¹ We assume trucks from the distribution center are returning empty.

² Miles per gallon (mpg). Trailer trucks used for shipping from the processor to its distribution center and from the wholesaler to the store have a capacity of 40,000 pounds and obtain 6 mpg.

Source: Author’s calculations based on case study and expert interviews.

Prospects for Expansion of Regional Food System: Frozen Broccoli

We define a regional supply chain as one where the product is produced, or grown, in the region. Therefore, we can say that a regional supply chain for frozen broccoli does not exist for Pittsburgh Store. The store’s leading brand of frozen broccoli originates in Mexico and Guatemala. Insufficient data are available to calculate value-added activity in the frozen broccoli supply chains.

Prospects for expansion of regional production of frozen broccoli on a scale to enter grocery retailing are limited.

Key Lessons for Pittsburgh Store

Pittsburgh Store is a small, independent supermarket located in the city of Pittsburgh, PA. It purchases most of its supplies from Primary Wholesaler but also purchases from other suppliers, including an ethnic wholesaler and a produce wholesaler located in Chicago. The product supply chains described in this case are cabbage and frozen broccoli.

Independent stores are often smaller companies that procure primarily from wholesalers, intermediaries between manufacturers and the store. In comparison, self-distributing supermarkets are large enough and have enough stores that they usually have their own warehouses and purchase directly from manufacturers.

The Store and Its Environment

Effect of size and economies of scale

- This store is very small. It has 5,000 square feet of selling space, roughly the size of a large convenience store. However, it stocks a full assortment of groceries and perishables. The large backroom storage acts as a storing-staging area for the owners' two other stores and hot truck.
- The store's small size hampers its ability to leverage the economies of scale that favor larger stores. Because it is small with limited selling space, it does not have the purchasing economies of scale that supermarket chains have. Larger companies buy from suppliers in full tractor trailer loads, in full cases, and have greater bargaining power. This means their purchase prices are generally lower. Smaller companies may have to order mixed loads which take more labor to load and unload, or less-than-full tractor trailer loads resulting in higher transportation costs per pound of product.
- In addition to procurement, operations such as delivery, replenishment, and labor are affected by economies of scale. Deliveries of small volumes are more costly and less efficient. Wholesalers and distributors charge more when they have to break apart full cases for small orders, and transportation is more expensive for small drop sizes, so stores may be charged an extra drop fee for small orders.
- The backroom storage space and the owners' additional stores enable this store to improve its purchasing power. The store also is able to source its needed ethnic products more directly. It sources these products from a produce wholesaler in Chicago that specializes in ethnic specialty produce as well as from an ethnic wholesaler in Chicago. The store owners put together orders once per week to fill a truck, although this means sourcing from about 400 miles away.

Effect of ownership structure

- The store is owned by entrepreneurial brothers with an interest in expanding their business. The brothers have worked to develop the supply chains serving their various stores and hot truck by sourcing from a number of different suppliers including the ethnic suppliers, and the primary grocery supplier.

Market Basket Supply Chains**Effect of regional production/industry**

- The Northeast supplies the store with very little cabbage, about 2 percent, despite the fact that New York is a top producer of cabbage in the U.S. and Pennsylvania has extensive specialty crop production. The store is located at the edge of the Northeast study region and very close to Ohio, Indiana, and Michigan, all with extensive specialty crops farms.
- The store purchases cabbage from two Midwestern produce wholesalers, and each wholesaler optimizes purchases to supply its distribution center(s). As a result, the store's cabbage comes primarily from the Midwestern states rather than the Northeast.
- Frozen broccoli, the store's other market basket item, is produced, cut up, and frozen primarily in Mexico. The Northeast does not supply any frozen broccoli.

Extent of regional value-added activity

- Most of the value-added activity performed in the region from the cabbage and the frozen broccoli supply chains is the retailing activity by the store itself. These activities include receiving, shelving, and sales activities.
- Of all the regional value-added activities for cabbage, the store performs an estimated 40 percent. Insufficient data were obtained to estimate the regional value-added activity for frozen broccoli.

Effect of geography/distance

- Transportation and distance to market have been and remain major competitive factors for Northeast farms. In the case of cabbage, the store is located in the Northeast as defined by the USDA rural development operation and is close to a number of cabbage producers; however, the store's major produce wholesalers are located in the Midwest making it difficult for Northeast producers to supply the store.

Appendix

Cabbage Industry Profile

Cabbage is a cruciferous vegetable and is closely related to such items as broccoli, cauliflower, Brussels sprouts, and kale. Brussels sprouts and kale, in particular, are growing in popularity while cabbage consumption is declining.⁶ Although cabbage is a common produce item, estimated cabbage consumption is low compared to other vegetables. For examples, U.S. fresh cabbage consumption was estimated as 6.2 pounds per capita in 2014, while fresh potatoes was 32.2 lbs. per capita.⁷

According to the National Agricultural Statistics Service (NASS) Survey, New York and California are the leading cabbage producers. In 2015, California was the leading cabbage producer and New York the second-leading producer, although they commonly switch rankings in production (Table A.1).

TABLE A.1: Top Producing Cabbage States, 2015

State	Utilized production <i>1,000 cwt</i>
California	5,865
New York	3,240
Florida	2,706
Texas	1,815
Georgia	1,258

Source: USDA, NASS. Vegetables: 2015 Summary. February 2016.

Northeast Cabbage Industry

Major cabbage-producing states in the Northeast other than New York include New Jersey and Pennsylvania. In total, the Northeast produced around 20 percent of the nation's cabbage in 2015 (Table A.2).

⁶ USDA, ERS - Food Availability (Per Capita) Data System." Accessed January 19, 2017. <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/>.

⁷ *ibid.*

TABLE A.2: 2015 U.S. and Northeast Fresh Cabbage Statistics

Source	Variable	U.S.	Northeast	Northeast, % of U.S.
1	Area planted, <i>acres</i>	59,530	11,030	18.5%
1	Yield per acre, <i>cwt</i>	360	1040	288.9%
1	Production, <i>cwt</i>	20,113,000	4,072,000	20.2%
1	Value of production, \$ <i>millions</i>	\$386.09	\$75.5	19.6%
1	Grower price, Fresh, \$ <i>per cwt</i> (packing house door)	\$19.20	\$20.80	108.3%
2	Fresh consumption per capita, <i>lbs</i>	6.2	na	na

Sources:

¹ USDA, NASS QuickStats Ad-Hoc Query Tool. Accessed January 19, 2017. <https://quickstats.nass.usda.gov/results/8A77D22E-6DB0-3CD0-AFDD-B784E155BF5E>

² USDA, NASS. Vegetables: 2015 Summary. February 2016. <http://usda.mannlib.cornell.edu/usda/current/VegeSumm/VegeSumm-02-04-2016.pdf>.

Cabbage is harvested in the fall and then placed into storage. Cabbage is sold after harvest until storage runs out, usually around March the following year. Quality tends to deteriorate in storage and producers time their production and sales such that their storage runs out at the same time that quality runs out. Therefore, although the Northeast can, in theory, produce enough cabbage to meet its consumption needs, cabbage is still purchased from other growing regions in order to help fill the gap in Northeast supplies from March until the next harvest in the late summer. Procuring from other growing regions also keeps the supply chains open and acts as a hedge against local natural disasters, disease outbreaks, etc.

Frozen Broccoli Industry Profile

According to the USDA Economic Research Service (ERS), 2.6 pounds of frozen broccoli were available per capita in the U.S. in 2015 (Table A.3.). In 2015, 5.9 pounds of fresh broccoli, almost twice that of frozen, were available per capita. In 2013, the last year the USDA ERS collected retail price data, retail prices for fresh broccoli florets were also higher than for frozen broccoli.

TABLE A.3: Broccoli—Average Retail Price per Pound and per Capita Consumption

Form	Average retail, 2013	Per capita availability, 2015
	<i>price per pound</i>	<i>pounds</i>
Fresh	-	5.9
Florets	\$2.57	-
Head	\$1.64	-
Frozen	\$1.87	2.6

Sources: USDA, ERS. "USDA ERS - Fruit and Vegetable Prices." Accessed February 10, 2017. <https://www.ers.usda.gov/data-products/fruit-and-vegetable-prices.aspx#.Ua5GqJxZ56I%20>. and USDA, ERS Food Availability (Per Capita) Data System. Accessed January 19, 2017. <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/>.

While approximately 80 percent of the 2015 fresh broccoli supply in the U.S. was produced domestically, 82 percent of frozen broccoli consumed in the same year was imported.⁸ Indeed, in 2015 broccoli accounted for about 30 percent of all frozen vegetable imports. Frozen broccoli imports come primarily from Mexico, Guatemala, and Ecuador (Table A.4.).

TABLE A.4: Frozen Broccoli, Cut/Reduced in Size: U.S. Imports from Selected Countries, 2015

Trade partner	Volume	% of total volume	Value	% of total value
	<i>1,000 pounds</i>	<i>percent</i>	<i>1,000 dollars</i>	<i>percent</i>
Mexico	444,974	78.9%	247,165	80.9%
Guatemala	62,019	11.0%	28,440	9.3%
Ecuador	38,334	6.8%	22,153	7.2%
China	15,568	2.8%	5,299	1.7%
TOTAL	564,283		305,379	

Source: USDA, ERS. "Data by Commodity - Imports and Exports." Accessed February 10, 2017. https://data.ers.usda.gov/reports.aspx?programArea=veg&stat_year=2008&top=5&HardCopy=True&RowsPerPage=25&groupName=Vegetables&commodityName=Broccoli&ID=9457#P09f71a77e64d48e8abb51897a0ab1c10_9_384.

From 2011-2015 the volume of frozen broccoli imports remained steady while the total value grew (Table A.5.).

⁸ "USDA, ERS Food Availability (Per Capita) Data System. Accessed January 19, 2017. <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system>.

TABLE A.5: Frozen Broccoli Imports: Volume and Value

	Volume	Value
	<i>1,000 lbs.</i>	\$
2011	607,354	291,400,870
2012	584,789	288,213,977
2013	515,093	264,692,431
2014	573,756	295,000,000
2015	564,293	305,379,000

Source: USDA, ERS, "Data by Commodity - Imports and Exports." Accessed February 10, 2017. https://data.ers.usda.gov/reports.aspx?programArea=veg&stat_year=2008&top=5&HardCopy=True&RowsPerPage=25&groupName=Vegetables&commodityName=Broccoli&ID=9457#P09f71a77e64d48e8abb51897a0ab1c10_9_384.

Data on domestic broccoli production do not differentiate production for frozen versus fresh use, and USDA does not report broccoli production statistics by state. But in Atallah, et al. 2014⁹, authors estimated broccoli acreage and yield for several states using USDA statistics and local verification. Overall, California and Arizona dominate production, but several states in the Northeast also have significant summer and fall production by higher numbers of smaller farms (Table A.6.).

TABLE A.6: Estimated Broccoli Acreage and Yields in Eastern and Western States

	Broccoli acreage				Number of farms	Yield (21-pound boxes/acre)
	Spring	Summer	Fall	Winter		
Maine	0	3,300	2,200	0	71	500
Maryland	0	145	145	0	40	400
New Jersey	0	69	69	0	74	450
New York	0	400	400	0	270	450
Pennsylvania	0	100	100	0	218	550
Total Eastern U.S.	0	4,014	2,914	0	673	n/a
Arizona	5,000	0	5,000	15,000	44	600
California	32,650	32,650	32,650	32,650	416	800
Total Western U.S.	37,650	32,650	37,650	47,650	460	n/a
Total U.S.	39,741	36,824	42,069	48,706	1450	n/a
North Eastern share (%)	0	11	7	0	46	n/a
Western share (%)	95	89	89	98	32	n/a

Source: Atallah, Shady S., Miguel I. Gómez, and Thomas Björkman. "Localization Effects for a Fresh Vegetable Product Supply Chain: Broccoli in the Eastern United States." Food Policy 49, Part 1 (December 2014): 151–59. doi:10.1016/j.foodpol.2014.07.005.

⁹ Atallah, Shady S., Miguel I. Gómez, and Thomas Björkman. "Localization Effects for a Fresh Vegetable Product Supply Chain: Broccoli in the Eastern United States." Food Policy 49, Part 1 (December 2014): 151–59. doi:10.1016/j.foodpol.2014.07.005.

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EB No	Title	Fee (if applicable)	Author(s)
2017-14	Case studies of supermarkets and food supply chains in low-income areas of the Northeast: Pittsburgh Store, Pennsylvania		Park, K.S., Gomez, M. and K. Clancy
2017-13	Case studies of supermarkets and food supply chains in low-income areas of the Northeast: Onondaga County Store, New York		Park, K.S., Gomez, M. and K. Clancy
2017-12	Case studies of supermarkets and food supply chains in low-income areas of the Northeast: New York City Store, New York		Park, K.S., Gomez, M. and K. Clancy
2017-11	Case studies of supermarkets and food supply chains in low-income areas of the Northeast: Madison County Store, New York		Park, K.S., Gomez, M. and K. Clancy
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