University of North Carolina at Asheville
Journal of Undergraduate Research
Asheville, North Carolina
May 2015

Food Hubs in Western North Carolina: Challenges and Opportunities

Jasmine Riazati
Department of Economics
The University of North Carolina at Asheville
One University Heights
Asheville, North Carolina 28804 USA

Faculty Advisors: Dr. Lyndi Hewitt and Professor Elizabeth Porter

Abstract

The local food system in Western North Carolina (WNC) has developed greatly in scope and visibility since the early 1990's. Local food producers face many challenges. Poor infrastructure in the food system limits small producers from accessing wider markets than the tailgate market. Limited access to financial and physical capital underlies these barriers to entry. This research investigates food hubs as a response to sustaining the expansion of the local food system. It develops the narrative of food hubs through surveys and interviews of hubs located in the thirty-four county region defined as WNC. Transaction cost theory is applied to the data to investigate how successful hubs can be as a leverage point for reach to new market opportunities. Food hubs reduce the cost to sell and buy local foods by reducing costs to identify trading partners and negotiate contracts. The data illustrate current challenges and future opportunities of food hubs. Hubs are limited by financial resources and in some cases consumer demand. The organizational model a food hub follows greatly affects its impact, sustainability and how well it serves producers. As the definition of what food hubs do continues to evolve future research should investigate the realities of producers who work with hubs. Local stakeholders, including producers, hubs and community members, may find these implications useful as they navigate building a sustainable local food system.

Keywords: food hubs, local food, food access

1. Introduction

Food hubs have emerged as an outlet for farmers to sell their products in market channels previously unavailable to them. Hubs assist with the aspects of aggregation, storage, processing, distribution and marketing of local food products. The notability of food hubs in prevalence and number is rising. Food hubs are an intermediary between farmers and previously unavailable market outlets, like wholesale markets. The USDA describes food hubs as "—a business or organization that actively manages the aggregation, distribution and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand" (Barham et. al, p. 4). Pinchot identifies hubs as entities "that through the development of business infrastructure and intervention in transactions, food hubs will make it possible for producers to gain entry into new and additional markets – thereby expanding agricultural production and economic activity" (p. 10). Matson and Thayer describe hubs as "innovative solutions" that overcome the gaps in infrastructure producers and consumers face (p. 43).

The definition and classification of food hubs continues to evolve, it encompasses a broad range of operating structures. Food hubs are differentiated from wholesalers based on their commitment to supporting exclusively locally produced foods. In this research local food is defined as being sourced within 250 miles[1] from origin to consumer (Martinez et. al, p. 5). Depending on the needs and circumstance in which a food hub arose, there are many organization structures and sizes the hub may find success in. Essential services offered by a hub: aggregation,

storage, processing, distribution and marketing. This generally includes a collection site and facilities for packing, processing, and storing foods. There are several models for food hub operation: farm to consumer, farm to business or a hybrid. They may be organized as a cooperative (producer or consumer driven), nonprofit, owned publicly or privately (Martinez et. al 15).

Prior research on food hubs has been limited to this point, Matson et. al write, "…investigation into the primary impetus for the formation of food hubs and local food chains, best practices, demonstrated impacts on the community, coexistence with current food supply chains, food safety, and the long-term viability of such entities have been explored only minimally in current literature" (p. 43). This work contributes to the existing discourse by investigating the experience of food hubs in Western North Carolina and offering insight into whether they are a worthwhile investment to facilitate the development of a local food system. The later area of research will be addressed through two lenses: assessing whether food hubs are successful in reducing transaction costs for small-scale producers (sellers) and buyers and surveying the nuances of financially sustainability food hubs face.

1.1 The Local Food Movement and the Western North Carolina Context

Outlets for local food sales fall along a spectrum of interaction between the producer and consumer. King et. all describe local food as being distributed between three supply chain types: direct, intermediated and mainstream (p. 6-8). Direct markets sales include transactions where no intermediary exists, like farmers markets and CSAs. Brown et. al define direct market sales as occurring in retail outlets including farm stands, tailgate or farmers markets, U-pick farms, and transactions through community supported agriculture arrangements (p. 577). Intermediated and mainstream channels are not direct farmer-consumer markets; they may be wholesale vendors or restaurants, for example.

Small and mid-sized farmers sell mostly through direct-to-consumer outlets, like farmers markets and roadside stands. Smaller farmers are encouraged to sell through direct markets because of the producer-consumer connection and the lower volume requirements. They face difficulties entering markets beyond the farmers market due to low production volumes (Matson & Cook, p. 6). This is compounded by challenges of poor infrastructure for distribution, high regulative costs and limited fluency in product marketing (Martinez, p. 3). Furthermore, larger volume accounts, like restaurants and wholesalers, are challenging to fill for small producers due to higher transaction costs for smaller producers. They lose out on the advantage of economies of scale, due to selling at low volues (Low and Vogel, p. 5). Large farms sell through intermediated channels, groceries and restaurants (Low & Vogel).

Food hubs allow local food products to be more widely available across geographic parameters and types of institutions. They market towards large-scale buyers, like hospitals, grocery stores and restaurants (Matson & Cook, p. 5). Barham et. al 2012 note the success of food hubs in easing access of intermediated markets for small and mid-sized farmers. Food hubs are a means for producers to engage in new markets, namely ones where they are unable to sell individually. There are high costs for a single producer to aggregate, distribute, and market their produce individually. As it stands, attempts to integrate small farmers into mainstream markets are ineffective in ensuring farmers see a sustainable profit (Perrett).

From 1992 to 2007 annual direct market sales in the United States increased from $404 million to $1.2 billion (Martinez et. al, p. 2). Between 2007 and 2012 alone direct market sales increased 8% (USDA 2012 Agricultural Census). In 1994, 1,755 farmers markets were listed nationally. By 2013 the number had risen to 8,144 (p. 9). Increasing consumer demand for locally produced food is bolsters this rapid growth in local agriculture (p. 5). However direct market sales account for less than .4% of U.S. agricultural sales. Ninety-five percent of direct market sales occur small and medium size farmers. Direct market sellers historically gross less then $50,000 annually (Martinez, p. iv).

Western North Carolina (WNC) sits in a unique geographic region; constrained by mountains most farms in the region are small. The WNC region is a 34 county region in the Appalachian Mountains and surrounding foothills as defined by the Appalachian Sustainable Agriculture Project. The average farm size in WNC is 85 acres, just over one-half of the state average and one-fourth the national average (Kirby et. al, p. 187A). This topography lends challenges and advantages to the food system. More than 75% of farms in WNC operate at profits less than $10,000 per year (USDA 2012 Agricultural Census). One-fourth of all farms in North Carolina are in the WNC region, whereas only one-ninth of the state's population lives in the region. Pockets of community have developed as a result of geographic barriers; community builds social capital and a network of social resources. Smaller farms contribute to greater flexibility and autonomy, an attribute as movements to change the status quo arise (Legnick). Heightened interest and recognition of local agriculture provides the backdrop which food hubs are being

investigated. As farms increase in size they are better able to leverage economies of scale to increase producer profit by reducing costs. If food hubs are successful in reducing costs for small-scale producers, then they are a worthwhile investment in infrastructure to facilitate the development of a local food system.

1.2 Food Hub Impact

Martinez et. al note that network building between producers is important in overcoming barriers to entry, like high initial investment costs in physical capital. Glowacki-Dudka affirms this saying that building "coalitions and partnerships" is useful in individual producers overcoming these challenges (p. 84). Food hubs serve as a prime opportunity to develop this social capital, a necessary element of a local food system. They also note organization structure and governance of a food hub can be helpful in assuring this challenge does not overwhelm the "cooperative competition" of individual producers (p. 86).

Small-scale agriculture has a low profit margin (Fischer et. al, p. 22). Farbman et. al found that as food hubs increase in size so does their profit margin (p. 35). Historically prices set in direct market sales outlets are flexible based on the customer-producer relationship (Deller & Brown, p. 5). However, Pingali et. al note that lower volume transactions face greater price volatility (p. 26). In their study of food systems chains in the Northeast Clancy and Ruhf found that producers who sold through food hubs see "higher prices, additional marketing options, and greater market access". The 2013 National Food Hub Survey found on average that food hubs operate on a 1.07 profit margin, this means that hubs face expenses that exceed revenues by 7% (Fischer et. al 22). The found that profitable, successful hubs had been operating for longer periods of time (older than 10 years) and were for-profit or cooperative in business structure. Pinchot found that 50% of food hubs in their national survey were financially viable operations. While 25% were near to financial viability (p. 18).

1.3 Transaction Cost Economics Applied to Food Hubs

Transaction cost economics seeks to explain how firms coordinate transactions in the marketplace (Hayek p. 522). Transaction costs are the costs that arise from making an economic exchange, the costs that arise from the coordination and fulfillment of the transaction. Oliver Williamson explained transactions as "the "the exchange of a good or service across a technologically separable interface" (p. 552). Potential transaction costs include the time cost of finding a market to sell a product, negotiating contracts, enforcing and upholding the contract and, as necessary, adjusting contractual agreements (Coase, p. 393). Other transactions costs include facilitating communication between parties (Williamson, p. 552). Time is a scare resource for producers and buyers alike, it underlies many of the transaction costs that make the market ineffective in coordinating transactions. Usually the market's price mechanism effectively identifies sellers and buyers. However, in some cases the price mechanism is not efficient or effective in identifying buyers. In the case of small producers the cost of coordinating transactions in non-direct market channels is too high and as a result these transactions do not occur. Organizations[2] emerge at times when market coordination of transactions is too costly. In the seminal work "The Nature of the Firm" Ronald Coase wrote, "the firm has no purpose" if transaction costs do not exist (p. 386). This claim reflects the observance that firms emerge when there is a coordination challenge, when the costs outweigh the benefits of the free market (p. 387). Food hubs have emerged as a response to the high transaction costs faced by producers and buyers engaged in the local food system. Until this point a regionally focused analysis of transactions cost within a network of food hubs is not available in the literature.

The main argument that underlies a transaction cost based analysis of food hubs is the interaction of time with the coordination of a transaction. The main tasks of food hubs are to aggregate, market and distribute local food products. Through aggregation food hubs decrease the number of transactions necessary for producers to sell product and for buyers to source product. Bell writes of the transaction costs as the cost of locating trading partners, establishing terms of trade, adapting a contract over changes in trade conditions and monitoring and evaluation of trade agreements. Coase notes the cost of identifying market prices and establishing a contract for a transaction. The cost of identifying buyers and sellers in a local food system is high, especially in regard to the time it takes to gather information and arrange a transaction. Increasing specificity of consumer demand and regulation have increased transaction costs in the food system. Customers demand products that look and taste a certain way, and they are willing to pay (Napier 2001). The greater the number of transactions a producer or buyer makes the greater amount of transaction costs they face. Food hubs work primarily with small-scale producers who account for 95% of direct market sales (Martinez, p. iv). These sales occur at low volumes to individual households, which means a producer must make many transactions to sell their products. The cost of arranging contracts with larger buyers, like

wholesalers, grocers or institutions, is greater due to the contractual requirements to mitigate risk and uncertainty. Hardesty developed a model to assess the opportunities for sourcing local food at an institutional level, for example in schools and hospitals. Through ordered logit analysis they found that institutions purchasing local food face higher transaction costs. Buyers who purchase from small scale producers face transaction costs imposed by the management costs of working with processing and marketing, the opportunity costs of time spent interacting with individual producers, costs of establishing contracts, costs of establishing quality and trust with a producer and the amplified costs of transporting products from individual producers on a small scale. Negotiation and monitoring/administrative costs are among the most notable transaction costs. This results in the inability of buyers to purchase large volumes of product leading to higher per unit costs deter buyers from purchasing from small-scale producers.

Fischer et. al found that food hubs open new market opportunities for producers because they reduce transaction costs for buyers of small, local producers. This is confirmed in the findings of Barham et. al who assert that hubs offer much value to the expansion of local food systems by aggregating producer's supplies to "a single point of purchase" (p. 1). Part of the challenge for farmers to meet consumer demand in this regard is due to high costs assuring these standards of "quality, size and delivery" (Pingali, p. 10). Furthermore, Pingali et. al found that farmers may be "locked into" traditional ways of growing that limit their capacity to adapt to changes in transaction requirements in new markets or markets that are changing (p. 10). Vertical integration as a governance structure is recommended as a response to the challenge of producers in satisfying buyer demands (p. 11). Concluding that by reducing transaction costs greater numbers of small scale producers will be able to access wider markets. They find that private sector responses to reducing transaction costs are most effective (p. 21).

Food hubs provide an institutional framework in which transactions are coordinated so that costs of the exchange are mitigated. Williamson introduced the term "governance structure" as an explanation of the organizational mechanisms that arise to coordinate transactions outside of the marketplace. The recommendations of Pingali to privatize food system transactions align with the emergence of food hubs. Vertical integration describes the process whereby a firm takes on multiple and increasing processes within a supply chain. Adopting a vertically integrated governance structure, when appropriate, can reduce transaction costs. This is because of the increasing economies of scale seen as a food hub takes on the aggregation, packaging, processing and distributing procedures that move a food product from the producer to the ultimate consumer. Economies of scale explains that the per unit cost of an item sold in a transaction decreases with larger and larger volumes. Food hubs are also useful in reducing the costs of uncertainty producers and buyers face in local foods transactions. In spot market contracts the risks of asset specific, uncertainty and frequency are greater than in a vertically integrated structure. Klein, Crawford and Alchian assert this on the basis that a vertically integrated governance structure limits opportunistic behavior and the costs of bounded rationality. Hubs also assert a certain branding power, quality assurance and social capital that limit the cost of uncertainty and opportunism. Opportunism refers to the ability of actors to act within self-interest, i.e. lying about product quality or availability. Bounded rationality refers to the limited and asymmetrical information available to both buyers and sellers. These elements further justify the emergence of food hubs as a response to the expansion of the local food system by opening market channels to small-scale producers.

2. Methodology

2.1 Methodological Background

The data in this research were collected through surveys and interviews of existing food hubs in the Western North Carolina region. The survey instrument was compiled from questions asked in the 2013 National Food Hub Survey, which is administered by Michigan State University's Center for Regional Food Research and the Wallace Center at Winrock International. The 2013 survey established a national baseline of the experiences food hubs in regard to the support they offer to local producers and the challenges and opportunities they face as they continue to expand. Survey questions addressed several realms of organizational operations. Including background, financial and staffing information to glean the level and amount of operations. It also asked questions about the producers and suppliers of the food hubs' products, commitment to local sourcing and services.

Questions asked in this research related to the concept of how food hubs reduce transaction costs for producers and buyers. This includes questions on the organizational structure, financial status, market channels and infrastructure support offered by the food hub. To lessen the commitment of required of participants adaptations to the depth and nature of questions were made. Specific financial data were not requested. Interviews were participatory. Meaning

that guiding questions were used to start the interview, however, most of the interview content arose from participant's comments.

The sample population for this research was found within the WNC region. We used the Appalachian Sustainable Agriculture Project's definition of Western North Carolina to populate the WNC region. This is a thirty-four county area including Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Catawba, Cherokee, Clay, Cleveland, Davie, Forsyth, Gaston, Graham, Haywood, Henderson, Iredall, Jackson, Lincoln, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yadkin and Yancey counties. Food hubs located within the WNC region make up the sample population. Participants were identified through listings of food hubs across the United States from the North Carolina Local Food Inventory and the National Good Food Network[3]. Nine food hubs exist in the region. Seven food hubs participated in the study. Survey respondents were staff employed by their respective food hubs usually working in a director or coordinator role. All participants completed the survey online or in person. Interviews were conducted in-person and via Skype to collect more data with select participants based on availability and willingness. Email communication was used to clarify information as well.

2.2 Defining Outcomes

The goal of this research was to investigate the experiences of food hubs in WNC in order to identify how they support the expansion of the local food system in the region. Through this research a narrative of the challenges and opportunities food hubs face will be developed. Two analytical lenses are applied to the data. The first lens is to assess the nuances of financial sustainability food hubs face. Do food hubs operate on profits? Are food hubs dependent on external funding for operation? The second lens applied to the data is a transaction cost analysis of food hubs interactions with investments in physical infrastructure and business, organizational arrangements. This asks whether a food hub successfully decrease barriers to entry in the marketplace for producers to sell and for buyers?

3. Results

The emergence of food hubs in WNC coalesces with regional and national movements to strengthen local food systems. In the region, food hubs have been active far before the recent buzz around local food. At this point WNC food hubs mainly offer aggregation and distribution services, rather than focusing on processing and value-adding procedures. In WNC the greatest resource hubs offer at this time is to lessen the transaction costs of individual farmers. In turn this addresses the questions of financial viability small producers face when selling at low profit margins and in low volumes.

Contrary to the USDA's working definition, a food hub may not support local, "source-identified" foods.
The concept of local food does not have a unanimous definition. This is reflected in the differing purchasing patterns of the surveyed food hubs and how they market their products. One hub noted that the definition of local food they use depends on the season; apples may be marketed as local if they come from Hendersonville and at other times if they come from Virginia. The concept of selling locally to buyers is a challenge to hubs as they expand. Geographic expansion of their customer base is an important step in growing profits and scale. The mission of a food hub seems to most shape their definition of "local". One hub shared their purpose is to "support NC growers". Another hub shared that they operate under the definition of local preferred by their buyers. In doing say they may buy and sell beyond the regional limits placed by local food. However, in regards to the customers of the food hub (not the producers who sell to the hub) the definition of local was more similar across respondents.

What emerged in the data is a correlative relationship between the organizational structure and mission of a food hub and their commitment to sourcing and selling product locally, as defined in this research to be within a 250 mile radius. A food hub that exists to make a profit is more likely to sell operate beyond local bounds. They are more liable to adjust purchasing patterns to satisfy consumer demand than their counterparts. They purchase products from regional, national and international sources and focus on creating access to fresh food products in their community. Whereas the data shows non-profit and cooperative models exist to serve producers over supplying consumer demand. A participant shared, "a lot want local", but the overall mentality is getting the "best you can for as little as you can".

3.1 Sustainability of Food Hubs

A foremost challenge to the startup and longevity of a food hub is access of financial resources. Low profit margins and high start-up costs are severe barriers to growth and expansion. The financial resources available to a food hub are one major indicator of the flexibility of a hub to set prices at which food products are purchased from products and sold. The presence of external funding and price flexibility were noted in the data. The prices a food hub buys and sells at are of interest in regard to the notability a hub offers to the expansion of a local food system.

Food hubs in WNC operate in three main organizational structures: as a business model, non-profits and cooperatives. Within these governance structures a difference was seen most distinctly between hubs that received external funding sources and those who do not. For-profit entities were more concerned with supplying consumer demand than nonprofits more defined by their commitment to 'local' and supporting small producers. Two of the non-profit hubs surveyed noted dependence on external sources of funding. However, the majority of the surveyed hubs identified as not dependent on external funding to carry out their basic functions of aggregation, distribution and marketing of local food products. The for-profit, business oriented models noted more independence from external funding sources. The existence of external funds lessens pressures on food hubs to be independently profitable. Which raises questions whether the hub would be continue without the funding. Recently established food hubs in WNC external funding sources are vital for to cover the outlay of initial operational costs, like purchase of physical infrastructure and establishing market visibility. Five of the seven surveyed food hubs were established in the last ten years. Themes noted surrounding their establishment demonstrate their work as an attempt to address the longstanding problem of how to match consumer demand with producer supply for in intermediated and mainstream marketing channels?

At least four of the seven food hubs actively sell product every month of the year. This number supports the assertion that food hubs increase the frequency of sales, thereby decreasing per unit transaction costs. It also demonstrates the ability of a food hub to sustain its own operation and provide market opportunities for producers across seasons. Table 1 shows the number of months out of the year that WNC food hubs are selling food products. In summer and spring the greatest number of hubs are active.

Table 1. Months in year food hubs sell food products

ID[4]	Selling Months
1	January, February, March, April, May, June, July, August, September, October, November, December
2	April, May, June, July, August, September, October, November
3	January, February, March, April, May, June, July, August, September, October, November, December
4	July, August, September, October
5	January, February, March, April, May, June, July, August, September, October, November, December
6	June, July, August, September, October
7	January, February, March, April, June, July, August, September, October, November, December

Food hubs that had been in operation for many years, noted the importance of word of mouth and reputation in maintaining business. This demonstrates that network building capacity of food hubs, that they foster community awareness. A well-cited concern of local food buyers, across market channels, is consistency in availability of product. One food hub shared the retention of farms from which they purchase produce is around 69% and the markets to which they sell is 95%. This commitment to producers establishes trust and reduces information asymmetry and likelihood for opportunistic business practices, as a hub is in partnership with the producer and buyers. In building trust and reducing uncertainty food hubs reduce the transaction costs associated with negotiating contracts. This affirms the notion that community networks and the resound social benefits reduce transaction costs. Which makes food hubs a promising avenue for local food system expansion.

3.2 Applications of Transaction Cost Theory

A lynchpin note in food hub success is that they reduce transaction costs for producers in taking a product to market. Small farms sizes and low profit margins are a resounding concern of stakeholders in the local food system in WNC. By identifying and defining transactions costs that exist in the local food system barriers to market channels can be more accurately targeted. Following the dimensions of transaction costs as laid out by Bell and Coase Table 2 explains the successes of food hubs in reducing transaction costs.

Table 2. Examples of changes in transaction costs for buyers and sellers

TC Example	TC of Producer	TC of Buyer
Identifying a trading partner	FH identify buyers. Number of transactions decrease (because the FH is one seller of multiple producer's products).	Buyers maintain contact with one seller, the FH.
Negotiating prices	Producers do not set prices with multiple buyers. They either set a price that FH buys product at or negotiate price with one buyer, the FH.	Prices are set already by FH or negotiation of prices is done with a single entity versus multiple producers.
Designing contracts	Decrease in number of transactions producer must negotiate. Greater trust based, relational contracting where a long-term relationship overcomes concerns of opportunistic actions or asymmetrical information.	FH may offer more consistency and longer term product availability assurance than an individual producer.
Adapting contracts to terms of trade	Contracts depend based on the model of a FH. They can allow more flexibility for producers to adjust offerings on a weekly basis.	
Monitoring trade agreements	More communication may occur between the FH and the producer than would with another buyer.	

Table 3 shows the top three sources of food hub sales across all market channels, direct, intermediated and mainstream. The greatest volume of sales goes through distributors. Next through community supported agriculture (CSA) models[5]. Individual producers face difficulty in access larger market audiences than direct markets, like CSAs. It is notable hubs sell through other market channels other otherwise available to individual producers, like large supermarkets, distributors and restaurants. A cited reason for this is the assurance of product volume food hubs offer and that a buyer must arrange fewer transactions to source the local product than when buying directly from producers.

Participants also identified future potential market opportunities. The most answered opportunity was in the expansion of sales to restaurants, caterers and bakeries. This is promising for smaller producers who might not be able to satisfy the quantity or consistency these markets demand in these intermediated market outlets. Following were opportunities with food cooperatives/buying clubs, storefront, and distributors and colleges and universities. A common theme from interviews with food hub managers is the difficulty of entering the market for institutions (universities, public schools, etc.). The bidding system on which many operate undercuts the profit to food hubs and makes it impossible for them to compete with larger entitles who can sell at lower prices due to their larger scales of operation. This data shows the difficulty a food hub faces transacting with larger firms. Negotiation of contracts and pricing inconsistencies underlie these barriers to entry. This finding is emphasized by the survey responses of food hubs. Access to institutional markets does not rank in the top market channels for total sales of WNC food hubs. Top sale market channels, unused options included food processors, colleges/universities, hospitals, food cooperatives, buying clubs, online stores, Pre-K food service, K-12 food service and other.

Table 3. Ranking of top three sources of food hub's 2014 total sales

	Rank of Sales		
Product Sales Outlet	**1st**	**2nd**	**3rd**
Large supermarkets or supercenters	1	1	
Corner stores, bodegas or small independent grocery stores		1	
Your own storefront	1	1	
CSA	2	1	
Farmers markets	1		1
Mobile retail units			
Restaurants, caterers or bakeries	1	2	
Distributors	1		3

Another dimension of transaction costs facing small-scale producers is the physical infrastructure associated with making transactions. Table 4 shows the physical infrastructure offered by food hubs and the importance of the services they provide. This includes vehicles for transportation, storage space for produce, packaging resources, time to negotiate prices and logistical arrangements. Of the physical resources and services provided by hubs few are highly asset specific. Respondents were asked what types of physical assets their food hub held. The physical assets held are investments in infrastructure that require greater consumer demand to be afforded. The prohibitive cost faced by the individual producer is lessened by this increase in frequency in transactions. Respondents were also asked to identify the main barriers to growth. Unanswered options included 'no barriers' and 'increase availability of processing infrastructure'. Three hubs noted increases in warehouse/storage, three hubs noted securing more product supply, one hub noted an increase in trucks owned (for deliveries), three hubs noted securing capital, three hubs noted business development, two hubs noted increasing staff, two hubs noted consumer education and one hub noted other. Although these areas of investment are not asset specific they allude to the poor leveraging power food hubs have as they attempt to grow, their challenge in accessing financial resources. Perhaps this is due most directly to uncertainty of future demand.

Table 4. Physical assets provided by hub and food hub potential for growth

ID	**Physical Assets Owned by Food Hub**	**Identified Barriers to Food Hub Growth**	**Change in Food Hub Demand**
1	Warehouse, Office space for the hub, Trucks, Retail space for the hub	Demand	Shrinking
2	Warehouse, Office space for the hub, Trucks	Increasing warehouse/storage space, Securing more product supply, Business development assistance, Increasing staff	Growing
3	Warehouse, Office space for the hub, Trucks, Rental space for other businesses, Retail space for the hub	Increasing warehouse/storage space, Securing capital, Consumer education	Staying basically the same
4	Warehouse, Office space for the hub, Trucks, coolers	Securing more product supply	Staying basically the same
5	Warehouse, Office space for the hub, Trucks	Securing more product supply, Securing capital, Increasing staff	Growing
6	Office space for the hub	Increasing warehouse/storage space, Business development assistance, Consumer education	Growing
7	Office space for the hub, Processing facilities, Rental space for other businesses, Retail space for the hub, certified kitchen	Increasing truck/delivery capacity, Securing capital, Business development assistance	Growing

Table 5 shows the makeup of food hubs in WNC in regard to their organizational legal status, access to external funding sources and according dependence. The data illuminates how funding availability and use affects the organizational structure of a hub.

Table 5. Food hub legal status and dependence on external funding

ID	Legal Status	Dependence on External Funding	External Funding Sources (additional to revenues)
1	LLC	Not dependent	N/A
2	Non-Profit	Highly dependent	Federal government, State government, Local government, Foundation grants, In-kind support, Donations from individuals
3	Publicly Owned	Not dependent	State government
4	No Formal Legal Structure	Not dependent	Local government Foundation grants
5	521a Agricultural Marketing Coop	Partially dependent	State government funding
6	Non-Profit	Partially dependent	Foundation grants, Donations from organizations, Donations from individuals, Membership fees
7	S Corp	Not dependent	Membership fees

Respondents were asked how the producers they source from changed their business operations since selling to their food hub. Three food hubs noted that all or most producers had diversified their product offerings. Four noted that some producers had adapted to sustainable production measures. Four noted that some or most of their producers had hired additional people. Two noted that most producers had increased their financial literacy, two were unsure of such changes. Three noted that most producers had increased the acreage on which they operate. Four noted that few of the producers they work with became GAP certified. Four noted that some or most producers had extended their growing season. Many respondents were not able to share information on how producers had changed their behaviors, this is an important note to consider when analyzing how pervasive certain trends in change in behaviors are. These changes in behavior patterns on the part of producers, are perceived by food hub employees, demonstrates a greater willingness and trust in the food hub.

4. Discussion

There is no such thing as cheap food, there is food made cheap (Enloe, p. 55). The problem food hubs are pitted to solve depends on the context in which they originate, their mission and purpose. The underlying interest of this research is to investigate how food hubs lower the transactions costs for the various suppliers, especially small producers. The data collected by the research investigate how food hubs operate and the challenges they face.

With the growing recognition of the local food movement consideration of its expansion and durability is increasingly important. Infrastructure that supports producers and buyers in the system is a primary concern. A paramount challenge is the distribution and marketing of local food products, produced on a small scale, to mainstream markets (Martinez et. al, p. iv). Food hubs are an evolving response to these challenges of market coordination of producer supply and consumer demand. Selling or buying through a food hub reduces transaction costs due to the advantages of economies of scale due through the power of aggregation. The concept of mission drift results from these high costs and explains how a hub may separate from its original mission over time. In the case of food hubs we see this drift occur as a result of funding restrictions and the need to geographically expand a customer base, perhaps outside of 'local' bounds. The question arises, "are we here to sell product or to support producers and consumers of the local food system?" A critique of food hubs argues that a hub simply integrates producers into a neoliberal, capitalist system where small farmers are systematically disadvantaged and will never see the successes large, industrialized agriculture does. Furthermore, assisting small producers in the process of engaging in intermediated and mainstream market channels is dangerous. Operating at on small scales it is likely

these producers will not only *not* be successful in mainstream markets, their minimal profit margins will be further reduced by competition. Nonprofit hubs are more likely to invest in infrastructure initially, through access of grant funding, whereas private operations do so on an "as needed" basis (Diamond and Barham). In doing so wider market access is facilitated to producers.

The data show that food hubs are useful and successful in reducing the barriers to entry that might otherwise make certain market channels inaccessible. The greatest identified area for food hub expansion of business is to restaurants, caterers and bakeries. These opportunities have low barriers to entry and are likely more able to cater to the nuances of food hubs. The volume demanded is lower, the contract requirements are lesser and negotiation flexibility is greater.

In the survey of WNC food hubs, the 'CSA model' seems to provide the greatest commitment to local food access and support of producers while engaging in new market channels. CSAs operate in many capacities. In their traditional form they provide individual producers with certainty that the supply they produce will be purchased. The formalized contracts in CSA models where a buyer commits to purchasing a certain share from the seller assures this. The challenge of asymmetrical information and market coordination experienced at farmers markets and working with larger entities, like wholesalers or grocers, is avoided. Food hubs operate under such a model to assess customer demand and lessen the risk of unsold supply. CSA model food hubs sell in WNC sell most often to household buyers. This raises questions of the scalability of such a food hub model. A CSA may initial support the development of a food hub, as they can operate with low capital investment. It is not clear from the experience of WNC food hubs if the CSA model will provide the necessary support for food hubs to engage in intermediated and mainstream market channels. This raises questions of the success of food hubs in overcoming negotiation based transaction costs.

The scope of this research does not provide adequate data to investigate whether food hubs are financially sustainable. What can be offered, however, are observations of the challenges and opportunities food hubs face in being financially sustainable, or their ability to remain solvent, in the long-run. Nonprofit food hubs are somewhat dependent on external funding sources. Comments of food hub managers and coordinators highlight the challenge hubs face in identifying demand and supplying it. The organization structure of a food hub greatly affects the number of employees and operational capacity of a hub, especially along the for-profit/nonprofit paradigm. At least one identified food hub, of the nine originally identified as the population sample, is no longer active. Perhaps this is an indicator of the limited resources and high temporal and financial costs it takes to establish a functional food hub.

5. Future Research

This research contributes to a qualitative understanding of how food hubs operate, the challenges they face and what direct needs are to facilitate their expansion. Application of these findings in conjunction with existing literature could contribute to creating a receptive policy environment for the expansion of food hubs. Schmit et. al note the need for more empirical data. Future research might consider an empirical model based on the findings of this research.

Jackson and Perrett identify a major critique of food hubs in the article "At What Cost? Food Hubs, Walmart and Local Food". That food hubs are inherently problematic as they seek to integrate local food system actors within a commercialized framework. Simply put, a small farmer cannot compete with per unit prices possible in industrialized agriculture. Data on the prices producers receive selling through food hubs and the producer-food hub relationship is useful in addressing this criticism.

Future research should collect longitudinal data to answer whether food hubs are financially sustainable. This concerns remains relevant at the national and local level. An examination of the dimensions of sustainability of food hubs is relevant to understanding their success. Do hubs strengthen the financial and production capacity of producers? Collection of financial data on whether food hubs lower the costs of producers to sell to markets is a high priority.

6. Conclusion

Food hubs in Western North Carolina have emerged as a possible solution to address the challenges that face producers and buyers in the local food system. This project shares explanatory data of the nature of hubs in the region. The survey data tells a story of infrastructure gaps and how accommodations are being made to mind the

gap. It shares perspective on how food hubs accomplish their goals through aggregating, distributing, and marketing food supplies. Producers benefit from economies of scale and reduced transaction costs if they sell through food hubs. Buyers benefit from decreasing the number of sellers (producers) they interact with. Food hubs can increase access to diversified market channels by aggregating individual producer's supplies. Food hubs decrease the uncertainty facing buyers that work with food hubs by providing a brand identity and quality.

Food hubs are a leverage point for food system actors to engage the local food system in a broader way. Transactions cost as they relate to the local food system exist through several channels: search and information costs, negotiation costs, and enforcement costs. Food hubs address most directly the transaction costs faced by producers once their product is ready for market and those faced by buyers as they source a product. They are a response to the high transaction costs that sometimes debilitate these economic exchanges. Qualitatively it is clear that hubs contribute important resources in allowing producers to enter new markets. Hubs are helpful in transitioning small producers from direct markets to intermediated ones, through increased demand and informal education on the business components of selling food.

7. Bibliography

Agriculture Marketing Service. (2012). Moving food along the value chain: innovations in regional food distribution. United States Department of Agriculture: Diamond, A. & Barham, J.

Agriculture Marketing Service. (2012). Regional food hub resource guide (Report No. 145227). Washington, DC: U.S. Department of Agriculture: Barham, J., Tropp, D., Enterline, K., Farbman, J., Fisk, J., and Kiraly, S.

Bell, C. R. (2010). Transaction cost economics. Free, R. (Ed.). *21st Century Economics: A Reference Handbook* (pp. 193-203). Sage Publications.

Brown, C., Gandee, J.E., & D'Souza, G. (2006). West Virginia farm direct marketing: a county level analysis. *Journal of Agricultural and Applied Economics, 38*(3), 575-584.

Clancy, K. & Ruhf, K. (2010). Report on some regional values chains in the northeast. National Good Food Network. Retrieved from http://api.ning.com/files/IiF-TRTMJ7aJESrTdpgXWIRDMneztcST-OvdbJbYwLUa0w0bguBqWMHZoADw0bNSQY8CaJ3UL6Vzbx0vqCW6g6rKgpUkBAFY/NESAWGValueChainReport12710.pdf

Coase, R. H. (1937). The nature of the firm: influence. *Journal of Law, Economics, and Organization, 4* (1), 386-405.

Deller, S & Brown, L. (n.d.). *Thinking about the economic impacts of local food systems* [PowerPoint slides]. Retrieved from https://wilocalfood.files.wordpress.com/2012/02/2012-wlfs-thinking-about-the-economic-impacts-of-local-food-systems.pdf

Economic Research Service. (2010). Comparing the structure, size and performance of local and mainstream food supply chains (Report No. 99). Washington, DC: U.S. Department of Agriculture: King, R., Hand, M., DiGiacomo,

Economic Research Service. (2010). Direct and intermediated marketing of local foods in the United States (Report No. 128). Washington, DC: U.S. Department of Agriculture, Low, S. & Vogel, S.

Economic Research Service. (2010). Local food systems concepts, impacts and issues (Report No. 97). Washington, DC: U.S. Department of Agriculture, Martinez, S., Hand, M., Da Pra, M., Pollack, S., Ralston, K., Smith, T., Vogel, S., Clark, S., Lohr, L., Low, S., & Newman, C.

G., Clancy, K., Gomez, M. Hardesty, S. Lev, L. &McLaughlin, E.

Enloe, C. H. (2004). *The curious feminist: Searching for women in a new age of empire*. California: Univ of California Press.

Farbman, J., Gerencer, C., Matteson, G. & Pirro, E. (2014). *Food hub benchmarking study 2014* [PowerPoint Slides]. National Good Food Network. Retrieved from http://www.ngfn.org/resources/ngfn-cluster-calls/food-hub-benchmarking-study-2014/benchmarking%202014%20slides.pdf

Fischer, M., Hamm, M., and Pirog, R. (2013). Key findings from the 2013 national food hub survey. National Good Food Network. Retrieved from http://kresge.org/sites/default/files/2013-national-food-hub-survey.pdf

Glowacki-Dudka, Michelle, Jennifer Murray, & Karen P. Isaacs. (2013). Examining social capital within a local food system. *Community Development Journal, 48* (1), 75-88.

Hardesty, S. D. (2008). The growing role of local food markets. *American Journal of Agricultural Economics, 90* (5), 1289-1295.

Hayek, F. A. (1945). The use of knowledge in society. *American Economic Review, 35*, 519-530.
Kirby, L.D., Jackson, C., & Perrett, A. (2007). Growing Local: Expanding the Western North Carolina Food and Farm Economy. Appalachian Sustainable Agriculture Project. Retrieved from http://asapconnections.org/downloads/growing-local-expanding-the-western-north-carolina-food-and-farm-economy-full-report.pdf
Jackson, C & Perrett, A. (2014). At What Cost? Food Hubs, Walmart and Local Food. Appalachian Sustainable Agriculture Project. Retrieved from http://asapconnections.org/front-page-posts/at-what-cost-food-hubs-walmart-and-local-food/
Klein, B., Crawford, R. & Alchian, A. (1978). Vertical integration, appropriable quasi-rents, and the competitive contracting process. *Journal of Law and Economics, 21*(2), 317.
Lengnick, L. (2014). *Resilient agriculture: Cultivating food systems for a changing climate.* British Columbia: New Society.
Lerman, T., Feenstra, G., & Visher, D. (2012). *A practitioner's guide to resources and publications on food hubs and values-based supply chains.* Agricultural Sustainability Institute. Retrieved from https://owl.english.purdue.edu/owl/resource/560/10/
Napier, R. (2001). Global trends impacting farmers: Implications for family farm management [Presentation]. Retrieved from http://www.fao.org/3/a-af144t.pdf
Matson, J., & Thayer, J. (2013). The role of food Hubs in food supply chains. *Journal of Agriculture, Food Systems, and Community Development, 3* (4), 43-47.
Perrett, A. (2007). The infrastructure of food procurement and distribution: Implications for farmers in Western North Carolina. Appalachian Sustainable Agriculture Project. Retrieved from http://asapconnections.org/downloads/growing-local-implications-for-western-north-carolina.pdf
Pinchot, A. (2014). The economics of local food systems: A literature review of the production, distribution and consumption of local food. The University of Minnesota, Agriculture Extension. Retrieved from http://www.extension.umn.edu/community/research/reports/docs/2014-Economics-of-Local-Food-Systems.pdf
Pingali, P., Khwaja, Y., & Meijer, M. (2005). Commercializing small farms: Reducing transaction costs. Food and Agriculture Organization. Retrieved from http://www.fao.org/3/a-af144t.pdf
Rural Cooperatives. (2011). Virtual food hubs help producers tap into local food markets, 78 (3). Washington, DC: U.S. Department of Agriculture, Matson, J., & Cook, C.
Schmit, T.M., Jablonski, B.B.R. & Kay, D. (2013). Assessing the economic impact of regional food hubs: The case of regional access. Cornell University. Retrived from http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5105918
Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology, 87* (3), 548-577.

8. Endnotes

1 This definition is contested and not statically defined across organizations nor regions. The Appalachian Sustainable Agriculture Project, for example, defines local food as existing within 100 miles from Asheville, NC (their headquarters) in the surrounding mountain counties.

2 The term firm is interchangeably used with organization in this paper.

3 The classification of food hubs is evolving. Although the survey population for this research was exhaustive in regards to the parameters set by the NC Local Food Inventory and the National Good Food Network it is clear that other food hub entities exist in the WNC region that were not included in the sample due to be overlooked by these master lists.

4 "ID" is used to identify participants throughout the descriptive tables in this paper.

5 CSA sales outlets typically function through community pledged support buyers commit to buying a share of product before the production and processing of the product. Through this model many small-scale producers sell product to individual households. Food hubs use this model for aggregating food supply and then distributing to individual households