Gaps and barriers along the North Carolina agri-food value chain

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Abstract

Purpose – The purpose of this paper is twofold: first, to formulate an exhaustive list of the issues, gaps, and barriers at each level of the agri-food value chain in North Carolina (NC), and second, to identify the issues of greatest importance to its members.

Design/methodology/approach – This research employed the Delphi technique in two stages of input. The first round of input was designed to create a comprehensive list of issues for each of nine "stages" of the agri-food value chain. In round two, the issues were prioritized.

Findings – The top ten responses of each stage were aggregated into themes that represent the most critical issues identified by respondents: connectedness within the value chain, access to markets and marketing, affordability/availability of food and food distribution, farm profitability, societal awareness, and education about healthy, local food, and supporting institutions.

Originality/value – The findings could be used by practitioners to inspire innovation in food-related products, programs, processes, organization, and marketing. The findings can help farmers, institutions, food distributors, policy makers, and other members of the agri-food value chain to make decisions about food distribution and access in NC and in other states facing similar issues and circumstances. The findings of this research also have further reaching implications, such as the connectivity of members along the agri-food value chain, the impact of a strong agri-food value chain on agritourism and the potential value of state marketing initiatives.

Keywords Value chain, Delphi technique, Farm-to-market, Food systems, Value-added processing

Paper type Research paper

Introduction

Regional and local agriculture has been shown to support rural development, create jobs, and secure food production, positively impacting the health of residents and economies (Herath and Hill, 2013). However, even in regions with significant agricultural output and resources, residents and economies have not always benefited. Reasons for this disconnect between resources and expected benefits vary and are often context dependent (Bloom and Hinrichs, 2011). The underlying causes can be better understood by researching the issues that exist with the actors and within the activities that connect farms and other food producers to the end consumer, known as the agri-food value chain (Rominger *et al.*, 2012; Passuello *et al.*, 2015). Identifying issues along the agri-food value chain could help its members (e.g. farmers, food producers, food retailers, and consumers) mitigate these issues, and help improve the chain's effectiveness and impact on local and regional economies (Bloom and Hinrichs, 2011; Kaplinsky and Morris, 2013; Grandori, 2015).

Identifying issues that exist among farmers, food producers, distributors, consumers, and institutional members of the agri-food value chain requires a comprehensive understanding of the challenges presented to these different entities (Curtis *et al.*, 2010; Taylor, 2005). This understanding can be accomplished by examining the context in which the stakeholders operate and make decisions, and by drawing out the problems, rifts, and barriers, from the stakeholders' perspective, that exist in food distribution, food access, and food demand (Herath and Hill, 2013; Passuello *et al.*, 2015). For example, waste and inefficiencies can increase supply uncertainty from the perspective of food retailers, while problems with distribution create demand uncertainty for farmers (Kaipia *et al.*, 2013).

This research seeks to explore agri-food value chain issues in the US state of North Carolina (NC). NC is agriculturally rich and severs as an attractive culinary tourist destination. At the same time and somewhat paradoxically, NC has a large rural population that is economically distressed (Curtis *et al.*, 2010). Nearly 30 percent of the population lives in 85 rural counties (Herath and Hill, 2013). Furthermore, over 60 percent of rural residents work in agriculture, but have a higher rate of poverty than their urban counterparts (Curtis *et al.*, 2010; Herath and Hill, 2013). Thus, NC is used as the context of this research because of the dichotomist relationship between its agricultural prowess and rural economies. The purpose of this study is twofold and reflected in the following research questions:

RQ1. What are the gaps, barriers, and disconnects perceived by members of the NC agri-food value chain?

RQ2. How are these gaps, barriers, and disconnects similar and different among the different members of the NC agri-food value chain?

Both questions are addressed by using a Delphi technique methodology with members of the NC agri-food value chain as the participants, from the perspective of a value chain analysis. The findings can help members of the agri-food value chain make decisions about the agricultural industry, food distribution, and economic development in NC and in other states facing similar circumstances. The findings of this research also have further reaching implications, such as how the connectivity among members improves the efficiency and effectiveness of the chain and the potential value of state marketing initiatives to members of the agri-food value chain.

Background
Food value chains
A value chain is set of organizations involved in different processes and activities that produce value in the form of products and services and distribute them to the end consumer (Christopher, 2010). The initial focus of value chain research was on individual businesses and performance, but now the concept encompasses a wider set of issues including social benefits, regional and local economic development, and consumer satisfaction (Kaplinsky and Morris, 2013). Value chains exist because each member of the chain adds value to products and services through activities to which they are best suited, and allows other members to do the same (Porter, 1985). For example, farmers grow crops and sell them to restaurants that in turn create dishes that are sold to consumers. In this way, the farmers maximize value by using best growing techniques, and the restaurant maximizes value through expertise in food preparation. The end consumer realizes the value through their purchases (Christopher, 2010). Collaboration, shared goals, and understanding multiple perspectives of the upstream and downstream value chain partners increase the chances of success for the different members (Mentzer *et al.*, 2001).

Food value chains are unique and differentiated from other product value chains largely due to the perishable nature of inventory, which significantly affects the logistics of each stage involved in the value chain system (Yu and Nagurney, 2013). The literature is replete with research on food safety, quality, and waste in value chains from the perspective that the interactions among the value chain members and their activities tell a more complete story (Kirezieva *et al.*, 2013; Tran *et al.*, 2013). Analyzing issues from the value chain perspective has also been used to uncover opportunities for improved efficiency in food value chains through the understanding sources of variability such as consumer demand, inventory, and seasonality (Georgiadis *et al.*, 2005).

Value-chain analysis
Value chain analysis allows researchers to deal with the dynamic linkages that are part of the inter-member nature of value chains, rather than static and bounded research on individual members (Kaplinsky and Morris, 2013). Problem solvers must move away from attempts to resolve singular issues and toward studying and reacting to systems as a whole (Meadows andWright, 2008; Kaplinsky and Morris, 2013). Investigating attitudes and circumstances from the viewpoint of all members of agri-food value chains is key to understanding the relationships and dynamics among the members (Leat and Revoredo-Giha, 2006).

Value chain analysis also allows researchers to uncover the waste among the different entities and processes of a value chain and may ultimately help reduce

inefficiencies and increase productivity (Hines *et al.*, 1998). Furthermore, value chain analysis can has uncovered how open communication and sharing of important information among members of the agricultural industry can reduce the likelihood of food contamination, improve visibility within food systems, and decrease waste (Kaipia *et al.*, 2013). This study incorporates a value chain analysis of the NC agri-food value chain to ascertain key food system issues and to help researchers, practitioners, and local food system resolve problems.

Setting

Agriculture and agribusiness play a primary role in the NC economy. The combined food-related industries in NC (agriculture, fishing, food processing, and outlets) employ over 420,000 workers and contribute $78 billion to the economy (Herath and Hill, 2013; North Carolina Department of Commerce, 2014). NC enjoys significant and diverse agriculture and aquaculture output (Curtis *et al.*, 2010), with food producers in coastal, plains, foothills, and mountain regions growing and harvesting livestock, as well as a wide variety of crops and seafood. The southeastern region of the state grows sweet potatoes, peanuts, soybeans, grapes, blueberries, and a wide range of animal proteins. Western NC is conducive to the cultivation of fruit orchards as well as vegetable production (Curtis *et al.*, 2010).

The diversity and abundance of food products in NC, coupled with community activism toward health issues and increased popularity of farmers markets, has driven demand for local foods. As a result, a number of NC farmers throughout the state representing all areas of the state's food production industry are turning to smaller markets that allow direct to consumer sales of food. These initiatives are supported by federal public health funding such as the Community Transformation Grant Project from the US Centers for Disease Control and Prevention. The interest in and marketing of local foods has also helped promote NC as a tourist destination. NC is ranked the sixth most visited state in the USA, and its tourism industry contributes $19.4 billion in revenue to the state's economy on an annual basis (North Carolina Department of Commerce, 2013).

Culinary tourism has the potential to strengthen a sense of regional identity, involving supply chain links between farms, restaurants, and consumers (Everett and Aitchison, 2008). Inwood *et al.* (2009) report that many chefs find that the taste of the dishes they serve was enhanced when those dishes included high quality and in season local foods. However, the researchers also noted the absence of strong connections between restaurants and farm groups (Inwood *et al.*, 2009). Indeed, despite the wealth of research on culinary tourism motivations, there remains a gap in the literature concerning the supply chain linkages between producers and distributors (such as farmers markets, festival operators, and restaurants) that compose the food trails that allow tourists to access local foods (Smith and Honggen, 2008).

Despite the rise in popularity of food-related tourism, not everyone can afford the luxury of culinary travel. The urban and rural poor within NC rely heavily on organizations who work in food access. The term food desert is an area in which consumers do not have access to healthy and affordably priced foods due to either physical or economic barriers (Weatherspoon *et al.*, 2012). Food deserts exist across geographic regions of NC and have been linked to negative impacts on human health manifesting in obesity, diabetes, and heart disease (Laria *et al.*, 2009). In fact, while the national average of food insecure households was at 14.5 percent in 2012, NC's average of 17.1 percent has drastically increased from the 13.2 percent average in 2005 (United States Department of Agriculture, 2013).

Methodology

Delphi technique

This research employed the Delphi technique to compose a list of agri-food value chain issues. The Delphi technique is recognized as a valuable tool for collecting expert opinions (Green *et al.*, 1990; Padel and Midmore, 2005) and a qualitative "judgmental" research technique that provides researchers with access to previously unexplored issues (Garrod and Fyall, 2005). Reliability is reinforced by eliciting the opinions of multiple experts, allowing each expert to review the opinions of other participants, and the assurance of anonymity which avoids issues of bias or coercion that may be presented during focus group or discussion scenarios (Ogden *et al.*, 2005). Each member of the group provides individual recommendations or opinions on the central issues. These ideas are then circulated to the other participating members of the group so that a consensus may be formed through collaborative review. Because of its quantitative, expert-based nature, the Delphi technique is useful in situations where statistical options are not practical. The technique also allows respondents time to reflect and provides them an equal opportunity to contribute.

Round 1 (R1) – formulating list of issues

The first step in the methodology was to formulate a preliminary list of issues along the value chain. Sources for this preliminary list were varied and are detailed in the reference section: technical and research reports, academic research articles, conference and meeting presentations, and professional experiences of the research team (see Kline *et al.*, 2013 for a detailed list). After the first draft of issues was created, each issue was assigned to a "stage" within the agri-food value chain. Ultimately, nine stages were selected: growth and production, farmer access to market, value-added processing, marketing, dining outlet, institution, retailer, direct to market outlet, and food access assistance (Table I). The issues were then assigned to the most appropriate stage(s), generating an initial aggregated list. Additionally, a group of experts reviewed and added to the list to improve the face validity of the named stages.

The Delphi expert panel was created by using three sources: recommendations from project partners; existing organizational lists, such as the membership list from the NC Agromedicine Institute, the members of the NC Local Foods Policy Council, and the tourism contacts for all NC counties; and recruitment solicitation through statewide and regional listservs. The statewide and regional listservs included an agritourism association (statewide), local foods (one statewide, two regional), niche meats (statewide), municipal and county planning (statewide), government agencies involved in "greening" programs (statewide), a network of people interested in entrepreneurship and small business (statewide), and a group interested in environmental education (statewide).

Once the experts had been identified, they were sent a survey containing the previously aggregated list of issues along the agri-food value chain. In R1 of the survey, the experts were asked to review the list of issues for the "stage" of the agri-food value chain with which they were most familiar. Then they were asked to identify any issues missing from the list for that particular segment of the agri-food value chain. The division of the issues into stages and sectors was done for two reasons. First, so as not to over-burden survey respondents, they were asked to select only one stage with which they most identified. This was done to reduce the volume of potential issues that the respondent would need to consider. The second reason was to identify the most critical issues within specific stages of the value chain. Responses from R1 participants were compiled and then added to the aggregate list of issues (see Table II for number of issues within each stage).

Stage	Description
Growth and production	This stage is relevant to animal protein, commodity crops, and produce. Processes that are involved at this stage include, but are not limited to: growing from seed, growing from stock, harvesting, treatment, storage, and packaging that happens on the farm
Farmer access to markets	This stage deals with the linkages that connect the primary production stage with the downstream members of the supply chain including outlets for production and methods of distribution, as well as related issues that impact farmers, distributors, and the food system suppliers as they fill market demand
Value-added processing	This stage includes large-scale food manufacturing, and small-scale food processing. Food products become "value-added" when it is processed in a way that gives the raw product an incremental value above its original market worth, or the food is cultivated in a way that differentiates it from similar products in the market. Common value-adding processes are washing, cutting, canning/jarring, freezing, drying, juicing, baking, brewing, fermenting, and others. Common value-adding differentiations include organic growing practices, sustainable operations, and geographic demarcation
Marketing	This category includes both marketing and sales. Marketing includes branding, messaging, advertising, promotions, and other techniques are included in marketing. Sales refers to pricing, profit margins, profit sharing, subsidies, premiums, among others
Dining outlets	This category includes lodging, restaurants, catering, food trucks, and food festivals. These members of the supply chain offer prepared foods to the end consumer
Institutions	These outlets include K-12 schools, college campuses, convention centers, hospitals, and prisons, and connect to large groups of consumers, who typically depend on these outlets for daily sustenance. These supply chain members are unique and play key roles in national health
Retailers	This category refers to the retailers of the food system, including supermarkets, grocers, corner stores, and buying clubs. Each of these types of retailers has different supply chain structures and face different sets of issues, despite the similar functions that they maintain in the overall food supply chain
Direct-to-market outlets	Produce stands, famers' markets and Community Supported Agriculture (CSA's) connect consumers directly with farmers for the purchasing of food products shortening the distance food must travel to reach consumers
Food access assistance	This stage refers to the mechanisms that support food security, food aid, and hunger relief activities in NC and includes multiple supply chain sequences (growing, procurement, storage, adding value, and distribution activities) for a specific audience, and emergency-response and disaster-relief programs

Table I.
Descriptions of the agri-food value chain stages

Round 2 (R2) – prioritization of issues

The research team reviewed responses from R1, combined similar responses, and then formulated the new list of issues into a second survey. Additionally, issues that exist in multiple stages were added to the relevant categories. R2 of the survey was distributed by asking participants to choose the top 20 most important issues in their selected stage of the value chain. The purpose of this was to identify which issues in each segment of the agri-food value chain the respondents felt were most important; and to distinguish which issues should be included in a survey to be distributed to the public in future research efforts. In the final stage, content analysis was employed to code the top responses from each stage into overall themes. Three coders underwent process training to ensure thematic agreement and to bolster inter-coder reliability (Hsieh and Shannon, 2005).

Stage	Number of items in Round 1 original list	Number of items added in Round 1
Growth and production	173	107
Farmer access to markets	117	18
Value-added processing	93	11
Marketing	96	20
Dining outlets	44	24
Institutional sector	32	35
Retail sector	87	19
Direct-to-markets outlets	48	34
Food access assistance sector	37	24
Total	727	292

Table II.
Number of survey
items (original and
added issues) in
Round 1

Results

The sample in R1 ranged (according to response rate) from 206 to 212 and 195 to 199 in R2, yielding a 32.5-35.3 percent response rate. In R1 of the survey, 57.3 percent of respondents were female, with a similar distribution of 55.6 percent in R2. The majority of respondents were between 50 and 59 years old (R1 = 28.5 percent, R2 = 32.8 percent), closely followed by the 40-49 years old group (R1 = 25.1 percent, R2 = 22.2 percent). The majority of respondents reported a race/ethnicity of white, non-Hispanic (R1 = 91.4 percent, R2 = 89.2 percent). Demographic information of the panel participants can be found in Table III.

The majority of respondents worked in the public sector (R1 = 39.6 percent; R2 = 41.2 percent), while involvement in the private (R1 = 22.2 percent; R2 = 20.6 percent) and non-profit sectors (R1 = 23.6 percent; R2 = 20.6 percent) was fairly evenly split within each round. Most respondents worked on farm/food issues locally (R1 = 42.2 percent; R2 = 43.4 percent), while roughly one-fifth worked regionally (R1 = 20.4 percent; R2 = 19.4 percent), and statewide (R1 = 19.9 percent; R2 = 22.4 percent) (Table III). Overwhelmingly, participants worked in business/ management or were entrepreneurs themselves, followed by education and research, farming, and economic development/tourism. The majority of respondents in both rounds have been involved in their present occupation for more than a decade (R1 = 52.1 percent; R2 = 58.0 percent). Very few respondents had been in their present occupation for less than three years (R1 = 9.7 percent; R2 = 10.8 percent).

Respondents were asked to indicate all of the ways in which they are involved with food, personally and professionally, by checking a list of activities or offering their own (Table IV). The reported food involvement varied widely, with respondents citing involvement home gardening (R1 = 56.9 percent; R2 = 52.5 percent), education/training (R1 = 43.6 percent; R2 = 46 percent), economic development (R1 = 38.9 percent; R2 = 31.3 percent), and community development (R1 = 40.3 percent; R2 = 38.4 percent).

Members of the Delphi panel were then asked to self-select which stage they belong to in the agri-food value chain, out of the eight identified possibilities. While most of the respondents chose the growth and production stage in R1 (R1 = 31.9 percent), the distribution of those who selected the remaining supply chain stages was fairly even, ranging from 6.3-12.1 percent. In R2, almost one third of respondents chose to respond to the growth and production stage (R1 = 32.5 percent). The respondent distribution of those who selected the remaining supply chain stages were fairly even, ranging from 7.2-11.9 percent, with the exception of the retailer sector (3.1 percent) (Table V).

Variable	Round 1	Round 2
Gender (n = 211; 196)		
Female	57.3%	55.6%
Male	42.7%	44.4%
Age (n = 207; 198)		
19-29 years old	8.7%	6.6%
30-39 years old	21.3%	19.2%
40-49 years old	25.1%	22.2%
50-59 years old	28.5%	32.8%
60+ and older	16.4%	19.2%
Race/ethnicity (n = 209; 195)		
American Indian	1.4%	1.0%
Asian	0.5%	2.6%
Black or African-American	3.3%	2.6%
Hispanic/Latino	0.5%	1.0%
Pacific Islander	0.0%	0.0%
White, non-Hispanic	91.4%	89.2%
Mixed race	2.9%	3.6%
Employment sector (n = 212; 199)		
Public	39.6%	41.2%
Private	22.2%	20.6%
Non-profit	23.6%	20.6%
Hybrid	8.5%	10.6%
Retired	1.9%	3.5%
Student	2.4%	1.5%
Unemployed	1.9%	2.0%
Work involvement in farm/food (n = 206; 196)		
Locally (one to three counties)	42.2%	43.4%
Regionally (more than three counties)	20.4%	19.4%
Statewide	19.9%	22.4%
Beyond NC	17.5%	14.8%
Occupation (n = 210; 199)		
Business/management/marketing/ consulting/entrepreneurship	71	72
Research/education	51	50
Farmer	27	27
Economic development/tourism	20	12
Health care	13	15
Planning	11	11
Environmental resources	5	4
Legal/attorney	4	1
Creative/arts/design	4	2
Disabled/retired	4	5

Table III.
Demographic and
employment
characteristics of
Delphi panel
participants

The top priorities identified by the Delphi panelists, according to the stage that they selected, are depicted in Table VI. The relationships among the various stages used in this study are depicted in Figure 1. The following sections discuss the important issues identified for each stage of the agri-food value chain.

Variable	Round 1 (%)	Round 2 (%)
Roles in the food system (n = 211; 198)		
Advocacy	28.9	24.2
Agri-law	4.3	2.5
Agribusiness	25.1	21.2
Animal health/stewardship	14.7	10.6
Aquaculture	–	3.0
Board member	–	23.7
Business management	19.0	19.2
Community development	40.3	38.4
Community gardens	25.1	27.3
Consulting	20.9	18.7
Cooking/baking	30.8	25.8
Cooperatives/aggregator	–	9.6
Distributor	17.1	13.6
Economic development	38.9	31.3
Economics	8.5	5.1
Education/training	43.6	46.0
Farming/growing	31.8	37.4
Food access	36.5	31.3
Food service/hospitality	13.3	12.6
Food-faith issues	8.5	8.1
Funder/grantor	3.3	6.6
Grant writer	–	22.7
Grassroots efforts	28.4	27.8
Home gardening	56.9	52.5
Institutional farm-to-fork	–	12.1
Involved in food events/festivals	37.4	29.8
Labor/farmworker issues	4.7	9.1
Land/environmental stewardship	37.9	27.8
Marketing	37.4	28.8
Planning	–	16.7
Policy-making	18.0	19.2
Processing	14.7	17.2
Public health	14.7	14.6
Public health/nutrition	20.4	16.2
Research	30.3	26.3
Restaurant operations	8.1	7.1
Social equity	21.3	21.7
Tourism marketing	15.2	9.6
Trade association	5.2	6.1
Volunteer	25.6	24.7
Waste management	6.2	9.1
Youth development	–	16.2

Table IV.
Food activity
involvement of
participants

Aggregated categories of issues

The key issues identified through the Delphi study offer a number of insights into some of the primary concerns shared by the members of the agri-food value chain in NC. Interestingly, the critical issues cited by respondents who self-identified with a particular stage did not necessarily correspond with that stage, something that belies an interconnectedness, however constructed, among the different value chain members.

Variable	Round 1 (%)	Round 2 (%)
Value chain stage/sector (n = 207; 194)		
Growth and production (seed to farm gate)	31.9	32.5
Farmer access to markets	9.2	10.8
Preparing and processing food	9.2	11.9
Marketing: branding, messaging, advertising, pricing	12.1	10.8
Dining outlets: lodging, restaurants, catering, food trucks, and food festivals	9.2	7.2
Institutions: K-12 schools, college campuses, convention centers, hospitals, and prisons	9.7	7.2
Retailers: supermarkets, grocers, corner stores, warehouse stores, and buying clubs	6.3	3.1
Direct-to-market outlets: produce stands, farmers markets, and community supported agriculture	7.2	10.8

Table V.
Percentage of participants in each agri-food value chain stage

Three phases of coding were used by all authors of this research to analyze the data. Three researchers initially categorized the data (open coding); the same three researchers then created interconnecting categories (axial coding). Finally, the remainder of the researchers authenticated coding and theme descriptions. Where there was disagreement, discussion ensued to gain consensus and revisions were made in the themes. The top ten responses of each stage were aggregated with similar responses into themes, regardless of the stage from which they originated; a total of 90 responses were analyzed during this stage. The researchers developed the themes by first analyzing the data individually, looking at the top responses and creating thematic structures to converge like-responses. Once each of the researchers completed their individual work, all of the themes were compared. Discrepancies were discussed and resolved, and a uniform aggregate list of themes emerged from the data. Seven distinct, yet related themes across all stages represented by participants in the Delphi study were revealed: connectedness issues, access to markets and marketing, availability of food distribution, affordability of food, farm profitability, societal awareness and education, and supporting institutions. Each theme is discussed in more detail in the following sections.

Connectedness issues
The overarching concern and interest of the participants seemed to be related to the issues of connectivity and access to other stakeholders in the value chain. Respondents from all of the stages noted connectedness issues, including access to processing facilities that work with small-scale producers, availability of distribution networks, building networks between producers, and dining outlets, policy that affects the relationship between institutions and local food systems, partnerships between local growers and distributors, and the creation of food hubs. Increased connectedness, sharing of important information and technology, and cooperation among the different members of the value chain can improve the efficiency and effectiveness of the value chain. Efficiencies are gained through streamlined distribution and reduced waiting times. Effectiveness is improved when cost savings from improved efficiency is passed on to the customers and consumers and through greater access to food products.

Connectedness was explicit in some cases, as in the case of retailers who have a stronger connection and relationship to farmers in the upstream value chain, and customers in the downstream value chain. Other participants had a more central focus on their organizations,

Stage	Description
Growth and production (seed to farm gate)	State agency support
	Long-term profitability potential
	Access to capital, labor, land
	Young farmer training
	Succession planning
	Good agricultural practices certification
Farmer access to markets	Buy local/organic movement
	Markets providing fair compensation
	State/local agency support
	Cooperatives and aggregators
	New distribution networks
	Identifying regional demand
	Agritourism
	Creation of food hubs
Dining outlets	Dining outlets networks
	Availability and affordability of local/organic produce/ meat/ seafood
	Quality control through supply chain
Institutions	Public and institutional policies that support buying local
	Producer/distributor partnerships
	Farming/cooking programs for youth
Retailers	Availability, affordability, and variety of local/organic food
	Mid-level distributors for mid-sized retailers
	Distribution time and cost to distribute local foods
	Transportation providers
	Ownership of food system
Direct-to-market outlets	Convenient access to affordable local produce
	Promotion of farmers markets and community supported agriculture
	A sense of community
	Creation of food hubs
	Farmer profitability
	Regulatory barriers
Food access assistance	Need for increased demand in low-income communities
	Availability/affordability of local/organic foods
	Supplemental Nutrition Assistance Program-Electronic Benefit Transfer infrastructure Support
	for food microsystems
	Creation of food hubs
	Distribution of excess produce to low-income persons

Table VI.
Top issues in each
stage of the value
chain as rated
among Delphi panel
participants

as in the case of food access assistance groups. Yet even these participants expressed concerns of the need for connectedness with other institutions and stages in the chain.

Availability of food distribution
Respondents also conveyed a concern for logistical issues related to the distribution channels within the value chain. Top responses include availability of distributors, availability of distribution networks, transportation between stakeholders, access to distribution channels for produce, availability of distributors for mid-size retailers, distribution to low-income persons, the need for transportation providers, and availability of distribution networks.
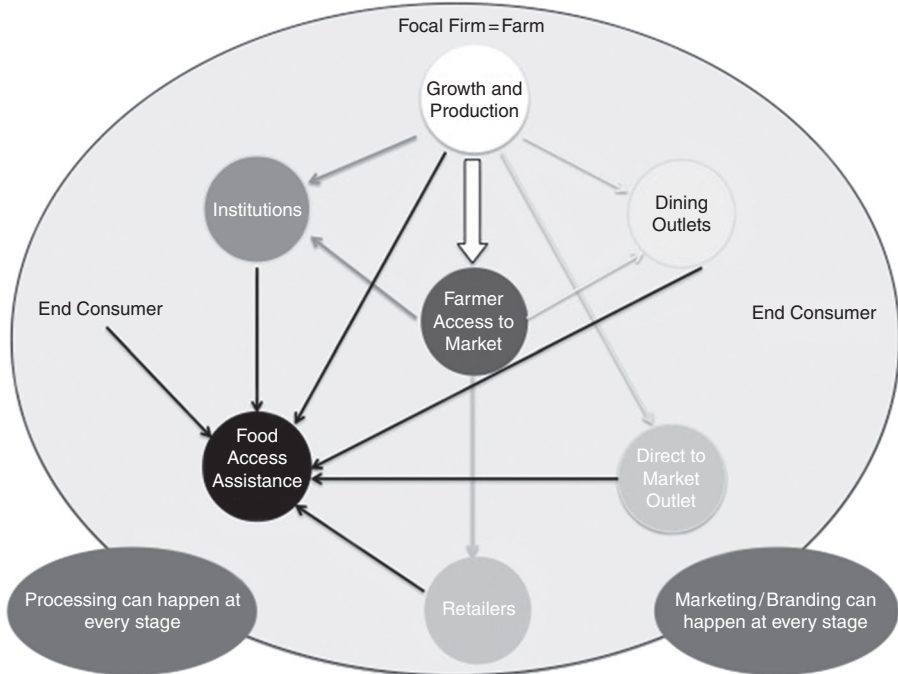
Figure 1.
Relationships among
the different stages
of the agri-food
value chain

Note: An arrow to "End Consumer" is assumed from all sectors except "Farmer Access to Market"
Source: Kline *et al.* (2013)

Affordability of food
The issue of food affordability was a top concern of the participants, evidenced in the prevalence of produce and protein costs and availability, cost/affordability of local produce, and the availability of and access to local and organic food across all stages. In some cases, the concern was with the cost to the restaurant or to the grocery store. In others, the cost of food to the customer. Product affordability may signal a concern for equal sharing of costs and benefits across members of the supply chain. The greater the concern, the more supply chain members may feel that some costs fall predominately on them, while other supply chain member gain disproportionately.

Farm profitability
The issue of farm profitability arose primarily in relation to input costs. Critically tied to profitability is the availability of land, cost of labor, and access to capital. Also linked to farmer profitability are training programs for young farmers and succession planning.

Access to markets and marketing
The desire to reach a wider variety of viable and profitable markets was apparent in the number of critical issues identified by the participants. The top responses include increasing the access to markets providing fair compensation for farmer's products, and facilitation of cooperatives and aggregating mechanisms. Related to market access,

promotional programs that increase market awareness and product outlets were cited as well. Responses related to the participants' desire for initiatives that would contribute to the access to markets in this area include promotion of local farmers markets, creation of "food hubs," and educational campaigns about local/organic foods.

Market access and product/market awareness suggests an ongoing concern with the current demand for product. Demand is not only affected by price, but also by the lack of consumer information about food access. Lack of information may affect demand patterns and reduce the power and influence of food producers to increase their access to markets, creating a circular cause-and-effect pattern, something the producers seem to understand. Another facet of this theme, buy local movement in agriculture/food and agritourism, suggests the desire of participants to emphasize and grow NC as a culinary tourism destination. This theme is also related to the desire expressed by participants to expand local and regional fairs, seasonal festivals, and other food-related activities that promote tourism.

Societal awareness and education
Overlapping with the marketing theme, the importance of consumer education was affirmed by the participants across the stages. Concern was expressed about the need to promote consumer awareness of where food originates, teach consumers about farms and food through agritourism, improve education on why buying local foods supports local jobs, and market the benefits of local foods, in general. Social awareness and education belays a concern for more indirect economic benefits than some of the other themes. Emphasis on community awareness may make members of the NC food value chain feel they are helping to retain current customers and to promote local eating to potential customers. Education helps instill pride and interest in NC agricultural issues and may encourage support for public programs that fund the interests of NC farms and fisheries and their products.

Supporting institutions
Respondents in growth and production, farmer access to markets, and especially institutional stages cited the need for additional support from government agencies and non-profit organizations. The issue of regulatory barriers/bureaucracy made the list by institutional and direct-to-markets outlets respondents. The only mention of supporting institutions by the food access assistance respondents was an indirect reference to the infrastructure of the Supplemental Nutrition Assistance Program-Electronic Benefit Transfer program at the state level and the desire for more direct market outlets to accept EBT, as well as the desire for support for food microsystems in low resource, rural communities. Institutions play a pivotal role in the success of value chains (Christopher, 2010).

Discussion and implications
The themes that emerged from the data represent the major issues expressed by the participants in the study, as members of the agri-food value chain in NC. The overarching theme of connectedness suggests cooperative and collaborative attitudes of the participants with local communities, with policy makers at both the local and state level, and with other members of the value chain. Institutional connectedness concerns suggest that participants understand the importance of institutions in the value chain, not only to support and promote their own interests, but also the interests of other

value chain members. Similarly, the items within the connectedness theme imply that the participants view their value chain relationships as holistic, even though they may interface with only one or two other value chain members.

The respondents' continuous view of the value chain is apparent in how they see themselves via their two primary roles in the chain. First, as representatives of individual links in the value chain, the participants are understandably concerned with their own profitability and access to markets. In this role, they see that overcoming gaps and barriers will allow them to succeed. Second, the finding that respondents from all stages mentioned "connectedness" as a critical issue suggests a stronger awareness of upstream and downstream stakeholders and that extending support to other members of the chain can improve the collective value chain. This finding is in direct contrast to many industries, where the value chain members are much less concerned about the chain as a whole, but rather their own improvement (Mentzer *et al.*, 2001; Lambrecht *et al.*, 2015).

The agricultural industry is in need of a generation of young farmers to emerge and provide a transition from today's aging farmer. Farm profitability therefore is relevant to attract a new wave of farmers to take up the trade. Inputs to farming such as seed and labor are increasingly more expensive and shifting weather patterns (e.g. drought) have rendered farmers caught in the middle of rising input prices and decreasing sales margins. While programs on succession planning and assistance for new farmers exist, these programs seem to be insufficient. Expansion of these programs would be a first step to improvement.

Access to markets and marketing and Societal awareness and education are related in that they both target the end consumer. However, awareness and education can come from multiple sources – both inside and outside the value chain. Media outlets such as online and print news, research reports, magazines, blogs, and movies can enlighten consumers to health and sustainability issues. Marketing campaigns directed at the consumer from the agricultural industry and the members of the value chain, e.g. a restaurant or grocery store can improve information about local products. Access to markets not only refers to identifying and connecting with local customers, but also increasing food related to tourism events, experiences, and outlets. Aggregating the many stakeholders involved in marketing agriculture output – advertisers, media, tourism marketers, caterers and event planners, commodity groups, government agencies, grocery stores, and restaurants – could provide a networking forum and would be a good first step in discovering synergies.

The concerns represented by the availability of food distribution theme expresses the participants' desire to find more affordable warehousing solutions, greater access to distribution networks, and efficiencies in trucking such as backhauls and rate discounts. It may signal the desire for a more integrated approach to distribution, which could be manifested in collaborative logistics relationships, information sharing, and cooperation (Mentzer *et al.*, 2001). Addressing concerns with the related economic theme, affordability of food, may serve to reduce costs in the agri-food value chain (e.g. increased connectedness and better distribution networks).

The finding that supporting institutions emerged as a key theme was not surprising as food production, storage, transportation, and preparation processes are highly regulated by government agencies. These processes are also closely monitored by food distributors and restaurants. Institutions also aid in food distribution and connection to areas of food need. Furthermore, institutions connected to, and existing within the agri-food value chain might launch their own investigation into constituent opinions so as to pinpoint specific actions that might improve effectiveness.

The results of this research can help members of the NC agri-food value chain in a number of ways. First, members can apply the idea of connectedness and reach out to stakeholders that they might not have previously thought to engage. This could lead to greater transparency and collaboration and knowledge sharing in the areas of market access, technology, and government resources. Similarly, the formation of industry groups would allow members along the chain to have a greater, collective voice to help influence state and local regulating bodies. Finally, the results are especially useful to individuals or organizations that are considering becoming part of the NC agri-food value chain by providing an understanding of the current issues. For example, entrepreneurs might consider including in their marketing strategy provisions for consumer education, the role of NC institutions, and the variety of products available.

Limitations and future research
One limitation of this research was the subjective nature of dividing the agri-food value chain into stages, labeling issues, and assigning issues into different stages within the value chain. While efforts were made to include a complete set of response categories for each question, omissions were still made. Additionally, each stage was not represented equally, which is a limitation of using the Delphi study method for multiple groups of stakeholders. Future research should include stronger measures to solicit each category of respondent. Also, the focus of this project and subsequent lists of issues are specific to NC, and should be reevaluated when attempting to apply them in other locations. The data collected from this research suggests the need for a more extensive survey directed at the general public that will determine the public perception of the agri-food value chain in NC, and more specifically, differences between various stakeholders and public groups.

Conclusion
Farm to table, agritoursim, and the emphasis on local food chains are all still taking hold in NC and other states and regions. Too often, researchers focus attention and efforts on the matters at hand, and rarely do stakeholders have time to reflect on the bigger picture and nuances of how members of the agri-food value chain connect. Encompassed in a value-chain analysis approach, the results provide insights that may otherwise not have been brought to light. One of the intended outcomes of this project is to inspire innovation in products, programs, processes, organization, and marketing. It is also hoped that the data collected will prompt advances that strengthen the agri-food economy, and increase availability of local, healthy food to all of the sector audiences represented in this study.

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