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# Institutional Versus Intermediated Buyers: Barriers And Requirements Of Buying Local Food Products

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# INSTITUTIONAL VERSUS INTERMEDIATED BUYERS: BARRIERS AND REQUIREMENTS OF BUYING LOCAL FOOD PRODUCTS

A Masters Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Natural and Applied Science

By

Jennifer M. Moldovan

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**INSTITUTIONAL VERSUS INTERMEDIATED BUYERS: BARRIERS AND REQUIREMENTS OF BUYING LOCAL FOOD PRODUCTS**

Agriculture

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## ABSTRACT

Expenditures on locally grown food products are only a small portion of the total food expenditures in the United States. In order to find a way to increase this percentage, this study aims to identify various types of buyers currently participating in the purchase of locally grown food products. Buyers were divided into two groups: institutions and intermediated. A comparison of for both classifications of buyers was done to find the difference in their perceived barriers and requirements for purchasing local food. Determining these differences could help in future policymaking decisions in local food industries. This will also help farmers who are willing to enhance their productions in the market for locally grown food products. In total, 115 surveys were completed by various buyers in the food industry. The results of this study showed that all buyers were interested in purchasing local food products, and all had some similar barriers and requirements, such as GAP and GHP. In comparing institutional and intermediated buyers, institutions were 22% less likely to purchase local food products compared to intermediated buyers. This difference could be a result of institutions having stricter food safety requirement and more barriers to sourcing local including "not knowing" where to source from and lack of supply.

**KEYWORDS**: local food, barriers to sourcing local, local food perceptions, institutional and intermediated buyers, logit model

This abstract is approved as to form and content

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# INTRODUCTION

## Problem Statement

The local food movement is growing but is a small percentage of the overall agricultural food industry sales. Throughout the United States, the annual sales of local food were roughly $4.8 billion in 2008 (Low & Vogel, 2011). This is up from the $1.8 billion of agricultural sales in 2007 (Martinez, 2010). In 2007, these local food sales only accounted for 0.4 percent of total agricultural sales, having increased from 0.3 percent in 1997.

While much of this local movement can be seen in farmers' markets and smaller, local restaurants and grocery stores, in the recent years many chains have begun to offer local products on their menus. The number of farmers' markets has grown five times what it used to be in 1994 (Aucoin & Fry, 2015). Some of the increase in local food sales has stemmed from the food scares in the conventional food sector (Morgan, Marsden, & Murdoch, 2006).

In order to accomplish significant increase in local food percentage, institutional buyers need to get involved. However, institutional buyers face many challenges in accommodating food procurement of locally grown food. Large institutions need consistent and large quantities of food on a daily basis. Unlike restaurants that can change their menus depending on what is in season, institutions have a set meal schedule because of their constant large demand (Strohbehn & Gregoire, 2003). Foodservice directors in charge of organizing an institution's meals have limited time, so dealing with multiple producers is not ideal (Johnson & Tevenson, 1998). In order to conveniently

supply these large buyers and help the local communities, food hubs could be a solution. These food hubs could serve as an aggregation point for farmers to increase the amount of local food available for institutions from one location. This study aims to look at the similarities and differences in the procedures, requirements, and interest in buying local between public institutions compared to the general, intermediated buyers within Missouri.

**Purpose**

The purpose of this study was to identify various types of Missouri buyers currently participating in the purchase of locally grown food products. In addition to the buyers' participation, this study will also look at the size and characteristics associated with each buyer. After the characteristics are determined, buyers will be divided into institutional and intermediated buyers to gain a better understanding of some of the challenges and preferences of each group. The survey data collected will be able to provide insight into the current policies for a range of institutions for their inclusion in local food procurement. Therefore, this paper will be testing if institutional buyers are less likely to buy local, but would have larger purchasing power than intermediated buyers.

# LITERATURE REVIEW

## Background on Local within the Community

**Overview of Locally Grown.** The idea of local food has not always been a popular topic in America. With the move of the country's government towards globalization from the 1970s through the early 2000s, the size of farms increased while the variety on a farm decreased (Dimitri, Effland, & Conklin, 2005). In addition, the improved technology caused the percentage of farm jobs to decrease substantially. With the large outflow of farm exports, the small farm communities were suffering because money was not circulating within itself, but was being spent outside the community. Studies have shown that employment and income can increase within a community by adopting or growing a local food system, thus helping reverse the above trend (Waltz, 2011).

Local can be defined in many different ways. In a separate study by the Hartman Group (2008), 50% of consumers reported that local meant within 100 miles of their home, while others (37%) indicated that local meant within the state. Local is considered to be either less than four-hundred miles or within the state of production by the U.S. Congress in the Food, Conservation, and Energy Act of 2008 for certain government programs (Hand & Martinez, 2010). This shows that even the government cannot place one definition on local.

**Farmer's Markets.** After the Great Depression and following the market crash of 2008, Stephen Thompson of the Rural Cooperatives with the United States Department of Agriculture (USDA) found that food cooperatives became more abundant (Thompson,

2014). Through the development of cooperatives, farmers' markets began to arise as a way for these cooperatives to reach out in their community.

Farmers' markets were a place for communities to come together where farmers can sell directly to final consumers. Farmers are then able to avoid using a marketing intermediary as well as give customers more of a variety of food products to choose from (Hughes, Brown, Miller, & McConnell, 2008). Connecting with one another also allows education of agriculture to spread amongst the community (Brown & Miller, 2008). The drive and intent to help one's community is there, and is evident in the growth of farmers' markets.

According to the USDA - Agriculture Marketing Services (USDA-AMS) division, farmer's markets have increased from 1,755 in 1994 to 8,268 in 2014 (USDA-AMS, 2014). Therefore, farmers' markets are an important driving force behind the growth in local food sales, which were reported to be $6.1 billion in 2012 (USDA-Economic Research Service (ERS), 2015). Such growth in sales is likely to have benefitted the local communities around the farmers' markets.

**Food Hubs**

Since large institutions have hundreds, if not thousands of meals to prepare each day, the quantity needed from suppliers is much greater than those of restaurants, or even grocery stores. These large quantities of local food are hard to come by in a single location, making it hard for institutions to buy what they need. A solution to this is the creation of a food hub among small to medium sized farms.

A food hub, broadly defined, is an aggregation point with marketing, storage and distribution of local food (Barham, 2010). There are currently more than 300 food hubs throughout the United States, having increased by 288% since 2006-'07 (USDA-ERS, 2015). In addition to the services above, food hubs are able to offer education and certification opportunities. For example, a food hub might use its resources to offer GroupGAP programs and/or other food safety training (Parrott, 2015).

With these services, along with the business infrastructure within a food hub, small to medium sized farmers are able to start closing the gap between themselves and the large scale producers. Food hubs are able to create a more efficient, yet still trusting, relationship with buyers while offering a larger quantity of uniform products (Wallace Center, 2014). These qualities will, in turn, reflect positively on the local communities, creating jobs and keeping money circulating within it.

The definition of local is flexible, making the boundaries for food hubs a little hazy. With the research gathered by the National Good Food Network (NGFN) Food Hub Collaboration, 385 miles from the food hub was the average distance considered local (National Good Food Network, 2015). Therefore, if a hub were located in south central Missouri, it would not be unlikely for northern Missouri buyers to purchase products from a south central Missouri food hub and consider it local.

Looking further into the current food hubs in the United States today, one can see why the definition of a food hub is so broad. Their basic business structures range from non-profit, for profit, or a co-operative structure. No matter the operational structure, food hubs have been profitable, averaging about three million in 2012 revenue (Wallace

Center, 2014). Although not all hubs are successful, those that find the correct structure and support from their community can have an impact.

Findings of the 2015 National Food Hub Survey found that most food hubs were located near the east and west coast, as well as the east north central region (Hardy et al., 2015). On average, hubs had been in operation for eight years and revenues had increased since the last survey completed in 2013.

Food hubs business models tend to be privately owned (40%) or for-profit (38%). Nonprofit (30%) and cooperative (20%) business models were not as common (Low et al., 2015). The 2015 national food hub survey found that only three percent of hubs are publicly owned (Hardy et al., 2015). The customer base for hubs is typically a combination of business/intuitions and direct to consumer, but some focus on one or the other. Just over half of the hubs serve both industries, while only to business/industry (28%) or consumer (20%) are not as common (Hardy et al., 2015). Being able to have a broad range of customers can be beneficial to the hub's survival.

Hubs have to be smart in their business transactions. If the majority of their product sales are in the hands of one or two customers, what happens when those few do not want to buy? The ability to have more customers to spread the risk involved in doing business (NGFN, 2014). In order to spread consumer base, almost a third of food hubs sell to both business and straight to consumers (Wallace Center, 2014). Not only do food hubs have to be volatile in their customer base, but they also have to be able to have qualities that interest buyers in purchasing local food from them.

Spreading out a food hub's customer base also allows for different requirements of their buyers. With food safety being an important factor in today's society, roughly

one third of food hubs require their farmers to have food safety certifications (NGFN, 2014). Offering education and training for food safety may mean a hub needs to reallocate some funds and find efficiencies elsewhere to extend these services (Wallace Center, 2014).

Buyers interested in purchasing from a food hub are across the board. The majority of buyers are within the grocery store and restaurant business (42.5%), while only a small percentage (2.8%) is institutional (NGFN, 2014). Food hubs are able to acquire a larger quantity for grocery stores and restaurants to choose from, while the institutional buyers require more than what a hub typically sells to a single buyer.

**Buyer Classifications**

For this study, buyers were grouped into one of two classifications, institutional buyer or intermediated buyer. Institutional buyers were defined as an organization devoted to the promotion of a particular cause or program, especially one of a public, educational, or charitable character. These institutions will include schools, universities, hospitals, prisons, and senior care facilities. Intermediated buyers are those who are doing a service to the communities. Intermediated buyers will include restaurants, grocery stores, corner stores, and catering services. These classifications are consistent with those in a review from the Union of Concerned Scientists looking into the growing economies of the United States (Mulik, 2016).

Intermediated markets are those where a producer sold their products to a specific buyer for resale. However, a producer who sold to a distributor who then sourced to an institution creates the lengthy institutional market (Hausler & Jansz, 2012).

Institutions use distributors to gain the large quantities they need in order to source thousands of meals a day. Clark (2016) found that if twenty-five percent of their institutional and intermediated buyers purchased locally grown food, over 4,000 farms and 12,000 jobs could be sustained.

**Intermediated Buyers of Locally Grown Products**

Local food has become a popular occurrence within grocery stores. Walmart would like to be part of the sustainable food movement to give buyers a look into how their food has been grown (Sustainable Food, 2016). When walking into a Walmart or larger chain grocer, it is not uncommon to find a local or sustainable section marketed through signs or advertisements. Smaller grocers, like Horrmann Meats Farmers Market in Springfield, MO, are strictly dedicated to selling local products from the area (Horrmann Meat Company, 2011). However, grocery stores typically require standard sizes as well as price look-up code (PLU) or universal price code (UPC) for the products farmers sell. Not only do grocers require PLU and UPC codes, but also have grading standards for their produce.

When purchasing food from a grocer, whether it is a small specialty store or chain, producers must be aware of receiving wholesale prices instead of retail. Therefore, producers must have a good idea of what the costs of producing, packaging, and transporting their crops are in order to negotiate pricing with the grocers. This communication between producer and grocer is key and maintaining a good relationship in order to sell and advertise a farmer's local products (Ernst & Woods, 2012). Producer

relationships are key when working with any buyer, but the pricing and standards for restaurants are more negotiable.

Restaurants are often able to change their menu items weekly and emphasize which items are prepared using local foods (WSDA, 2010b). This comes with a price, though, since restaurants can only handle so much food at one time and typically requires liability insurance as well (Gibson, 1994). However, restaurants take pride in purchasing local and being able to support local farmers and share the freshness and homey feel of a meal your grandma could have made, like the Metropolitan Farmer in Springfield, Missouri (Metropolitan Farmer, n.d.).

Even though there are some strong benefits to selling to restaurants and grocery stores, there are also many challenges as well. Producers must be willing to have open and honest communication with the buyers as well as coordinate delivery schedules. Constant quality and quantity is also needed for both grocery stores and restaurants. Even though their quality grades are not the same, consistency is still important (WSDA, 2010b).

**Institutional Buyers of Locally Grown Products**

Sourcing local food at a grocery store or restaurant can begin to return cash flow to the community, but what if a public institution would purchase local food? Individual institutions including schools, universities, hospitals, and assisted-living facilities, serve hundreds, if not thousands, of meals daily. In Missouri, there are over 500 public school districts (Missouri School Districts, 2015) and over 200 colleges or universities (CollegeStats, 2014). There is one federal medical prison located in Springfield, MO,

housing over 1000 inmates (Medical Center for Federal Prisoners (MCFP), 2015). In addition, there are twenty-two state correctional and treatment centers within Missouri (Missouri Department of Corrections, 2015). Altogether, between schools, colleges, universities, and prisons throughout the state, over 250,000 people are served each day. Schools alone spent approximately $598 million on local food in the school year 2013 – 2014 (USDA Farm-to-school census, 2015).

**Schools.** Of all the institutions examined in this research, schools are ahead of the rest with incorporating local food into their meal programs. There are farm-to-school programs that make it possible for a school to purchase fresh products from farmers within their area. These products can include vegetables, fruits, dairy products, and beans. According to those working for the Farm-to-Table community, products are typically considered local if grown within the state for a farm-to-school program (Farm-to-school FAQ, 2016).

Farm-to-school programs can also incorporate hands-on opportunities for students. These activities can range from classroom lessons on nutritional value and ways to prepare local food to taking a field trip visiting a local farm to see the process of picking or planting. According to Stephanie Mercier, the senior policy and advocacy adviser for the Farm Journal Foundation, there is a need to increase the knowledge of the general public regarding agricultural systems (Mercier, 2015). Therefore, these hands on activities would begin to teach the next generation about agriculture's importance.

As of 2012, 40,328 (44%) of the public schools in the United States have a farm-to-school program, annually spending roughly $385 million on local food (National Sustainable Agriculture Coalition, 2015). More recent data shows that more than 42,000

schools had farm-to-school programs and spent approximately $598 million in the school year 2013 – 2014 (USDA Farm-to-school census, 2015). The National Farm-to-School Network is for schools to find easy access to research, resources, and information needed to help start and improve their local procurement.

Census data is not the only thing the government provides towards schools' local procurement abilities. The government began to encourage and support the procurement of local fruits and vegetables in the mid-1990s. The Department of Defense was approached in 1994 to offer a service to deliver fresh fruits and vegetables to schools while on the way to deliver food to military institutions and other sites (USDA-FNS, 2012). This program started with supplying eight states, and has grown to supplying almost all of the United States, plus the District of Columbia, Puerto Rico, and the Virgin Islands.

The Missouri Department of Agriculture (MDA) funds grants the farm-to-school programs and local youth initiatives (MDA, 2015). Value-added farm-to-school grant programs give small businesses up to $200,000 to purchase coolers, freezers, washing equipment, packing equipment, and safety certifications that will help get local food to local schools more efficiently and safely. The local foods matching grant program provides grants to farmers' markets, community gardens, or for youth initiatives (MDA, 2015). There are schools that have received this grant, like the Kirksville R-III school district, to develop a gardening program for student education and hand-on experience.

**Hospitals and Healthcare Facilities.** Like with schools, hospitals have been trying to incorporate local food into their cafeterias. There are hospitals throughout the United States that have begun working with local farmers to find a healthy alternative for

their patients. For example, the Fletcher Allen Health Care facilities in Vermont have coordinated with seventy farmers to procure local food (Lee, 2013). With this program, they purchase almost all of their beef and a good majority of their egg supply locally.

Similar to the farm-to-school programs, hospitals have a program called Planetree that is a form of business organization aimed at creating a better healthcare program as a whole. Part of their mission is the 'Food is Care' initiative that stresses the importance of food with the overall attitude and health of the patients (Planetree, n.d.). Through this program, over two hundred hospitals throughout the United States have started this patient-centered care program. Only five of those hospitals are within Missouri. Hospitals in Kansas City, the Ozarks, and St. Louis are involved in their region's food policy councils. These hospitals are active in supporting healthy incentive programs, participating in food policy council meetings, and helping the local farmers' markets to grow (UCSUSA, 2014). This could be due to the Affordable Care Act (ACA) passed in 2012 that requires tax-exempt hospitals to identify and address community needs. On average, these hospitals spent 7.5% of their expenses on community-benefit operations (Young, 2013). Most of this money went to patient care reimbursement, but the remaining expenditures went to community health improvements.

Although many people have the assumption that assisted-living facilities provide food that is unappetizing, a company called Unidine is working to change people's perceptions. Unidine is a culinary company that serves about 120 senior living kitchens in the country, and it is implementing a fresh food pledge by all kitchen staff at these facilities (Jaffe, 2015). These facilities have large walk-in refrigerators for storage of fresh, not frozen, fruits, vegetables, dairy, and meat.

**Prisons.** Originally, inmates were required to grow all the food they needed in order to cut taxpayers' costs. However, through the years food has been ordered due to cheap packaged products. Prisons are still allowed a garden, no livestock rearing, for inmates to tend to (Bosworth, 2002). According to the food service manual of the Federal Bureau of Prisons, gardens can be allowed so long as there is a full time farm manager and the Farm Service Agency (FSA) helps in the planning of the garden (U.S. Department of Justice, 2011).

There are only a handful of correctional facilities within the United States that have shared of their farm-to-prison programs (Bulger, 2015). Three of the six facilities implementing local grow their own produce. The prisons use the on-site farms to educate inmates on the importance of sustainability and to give them job-training skills. The other three facilities are buying from local farmers in the communities, spending about 20 – 30% of their food budget on local products (Bulger, 2015). For example, the Montana Women's Prison alone spends about $60,000 on local food each year.

Institutions supply hundreds, if not thousands, of meals daily creating many barriers to purchasing local food products. Institutional interest in local food purchases has only recently grown since the early 2000s. For that reason, there are limited studies that have looked into the barriers and interest of institutions in purchasing local food. However, a handbook from the Washington State Department of Agriculture found that most all institutional buyers are hard for farmers to sell to due to difficulties finding a contact as well as food safety certifications (WSDA, 2010a). Once a producer is able to find a contact, the negotiation of price and certifications is typically the next barrier.

For most buyers, the budget under which they operate tends to be tight. This is no different for hospitals, which are cost-conscience in their food purchases (Eisen, 2010). This causes the hospitals to lean towards the easy, and consistent, bulk purchasing companies. Also, because the business leaders of a hospital have to approve changes within a hospital's practices, their usual lack of knowledge, patience, or interest in local food make it difficult to get regulations passed (George, Matts, & Schmidts, 2010). Those who want to source local would need to speak up and educate others around them.

Not only does cost include the upfront money spent, but also the wasted food items for institutions. The schools may be worried that with the addition of more fruits and vegetables to the menu, more food will be wasted, wasting money. After all, Tim Carman, a Washington Post food section reporter, found that school programs have considered a piece of pizza as a vegetable serving (Carman, 2012). The increase of local fruits and vegetables offered, instead of pizza as a vegetable, could help bolster the local community while helping with the child obesity problem in the US. In addition, David Conner, an associate professor at the University of Vermont in agricultural economics, found that a school's desire to provide healthy lunches is limited by the budget given (Conner, 2011).

A study looking into the perceptions of local food by institutions and commercial food buyers was done through a three-phase project. Phase one consisted of a mail-survey looking into the buyer's importance of food safety as well as benefits and challenges in purchasing local food. 18 restaurants (15%) and 66 institutions (39%) completed the survey. For the survey, a 5-point scale (5=high obstacle) was used. Phase two consisted of a pre-and post-test of nine buyers' knowledge of local food

procurement. Finally, phase three was simply a food safety test for pathogens, which all turned up normal. The major obstacles found were year round availability, multiple vendors, consistent packaging, food safety, timely delivery, and payment. On average, institutions saw these obstacles as more off a challenge than restaurant respondents. However, there was still evidence for interest in local food purchases by all buyers who completed the survey (Strohbehn et al, 2002).

Dr. Jacob Brimlow and James Matson did research done on the barriers to local food sales of buyers. This study consisted of twenty-five California buyers and twenty-seven North Carolina buyers representing both intermediated and institutional buyers. All buyers surveyed indicated the increased need for local food due to consumer interests. Through their initial data analysis, it was shown that institutions had stricter food security requirements as well as a higher need for supply/delivery convenience in the local food procurement (Brimlow & Matson, 2015).

Previous studies have surveyed food service personnel looking at the costs and barriers of local food versus the bulk commodity purchases they receive from the outsourcing companies that institutions hire to manage their cafeterias. For example, Shermain Hardesty, an agricultural and resource economics professor at University of California Davis, looked into the influence of transaction costs and prices for different institutions, with and without locally grown produce buying programs, and how it affected their locally grown produce practices. Hardesty used an ordered logit model and found the attitude of each food service provider in regards to environmental and social values offered the most variability among the decision of buying local produce. Of the variables tested, he found the lack of year round availability, vendor application process,

local stable prices, number of vendors per institution, and being a four-year institution to be significantly different at $p<0.05$ (Hardesty, 2008).

# MATERIALS, METHODS AND MODELS

## Survey Design

A survey of buyers was conducted as a part of a feasibility study for a food hub in south central Missouri. The study was supported by a grant from the Rural Development Program of the United States Department of Agriculture (USDA). A steering committee, made up of local farmers and local food experts, helped in reviewing and revising the survey instrument. The final survey (Appendix A) contained twenty-nine questions pertaining to a buyer's food purchasing capacity, perceptions of local food, food safety and standards, and their interest in purchasing from a food hub. This project was granted exemption from the Missouri State University Internal Review Board (IRB) (October 23, 2014; Appendix B). The survey was conducted for approximately ten months in 2015 among various types of Missouri buyers, from corner stores to hospitals.

Due to the lack of accurate statistics about the number and types of buyers throughout Missouri, a specific percent of buyer responses could not be obtained. The goal was to obtain 500 completed surveys. There was an attempt to keep the number of respondents from each of the two groups, institutional and intermediated, balanced for analysis.

In order to analyze these business sectors, the survey instrument described above was completed by owners, managers, or food service directors of food purchasing entities within Missouri. This instrument was distributed through sruveymonkey.com or in person. In the survey, food buyers were asked to indicate their current stance in buying local food, as well as their requirements, process of, and interest towards buying locally

through a food hub. When all the data was collected, SPSS statistical software and LIMDEP econometric software were used to get descriptive data and estimate regression models, along with a factor analysis of different attributes.

**Conceptual Model**

The framework for analyzing buyer's decision to purchase locally grown products was developed based on the classical profit maximization model, expressed in the following equation:

$$\pi_{ji} = \alpha_j F_i(R_i, K_i) + u_{ji}, \qquad j = 0,1; i = 1, \dots, n$$

Where j=1 if a buyer purchases locally grown products, and j=0 if otherwise. R is the vector of buyer specific specifications including type of buyer, size of fresh produce purchased and history of purchasing locally grown products. K is a vector of perceived or actual challenges faced by buyers and their attitude toward purchasing local products. $u_{ij}$ represents the randomly and normally distributed error.

The $i_{th}$ buyer will purchase local products, j=1 if $\pi_{1i} > \pi_{0i}$ or if the non-observable variable $y^* = \pi_{1i} - \pi_{0i} > 0$. $Y_i$ is observable and represents $y^*$. $Y_i$ is equal to 1 if buyers decide to buy local, and 0 if not. $Y_i$ is the function of independent variables including type of buyers, buying requirements, perceived challenges in buying local and attitude toward locally grown products.

**Empirical Model**

The relationship between buyers' willingness to purchase local products and buyer characteristics, safety requirements and attitude was examined by modeling the

indicator variable $Z_i$ for the $i^{th}$ buyer as a function of the business's characteristics, safety requirements and attitude is as follows:

$$Z_i = \beta' X + \varepsilon_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_k X_{ik} + \varepsilon_i, \ \ i = 1,2,\ldots,n$$

Where $X_{ij}$ represents the $j^{th}$attribute of the $i^{th}$respondent, β's are the parameter vectors to be estimated and ε is the error term.

Using the logistic distributional assumption for the random term, the probability $P_i$ (that the $i^{th}$ buyer perception of purchasing locally grown products) can now be expressed as:

$$P_i = F(Z_i) = F(B_0 + \sum_{j=1}^{k} \beta_j X_{ij}) = F(\beta X_i) = 1/[1 + \exp(-Z_i)]$$

The estimated ß-coefficients of the equation above do not directly represent the marginal effects of the independent variables on the probability $P_i$ that the buyer purchases local products. In the case of a continuous explanatory variable, the marginal effect of $x_j$ on the probability $P_i$ is given by:

$$\partial P_i / \partial x_{ij} = \left[\beta_j \exp(-\beta X_i)\right]/[1 + \exp(-\beta X_i)]^2$$

However, if the explanatory variable was qualitative or discrete in nature, $\partial P_i/\partial x_{ij}$ does not exist. In such a case, the marginal effect of a discrete explanatory variable was obtained by evaluating $P_i$ at alternative values of $x_{ij}$ taking on values of one and zero. The marginal effect of such a variable would be: $\partial P_i/\partial x_{ij} = P(x_{ij} = 1) - P(x_{ij} = 0)$

The following model was specified to examine the probability that a buyer would be willing to purchase local food products in the empirical analysis:

$$BUYLOCAL = \frac{e^{\theta}}{1 + e^{\theta}}$$

Where, $\theta = \beta_0 + \beta_1 BUS\_TYPE + \beta_2 PRICENEW + \beta_3 OPERATCH + \beta_4 CAPACITY + \beta_5 LOCAL\_IMPACT + \beta_6 EATING\_LOCAL + \beta_7 HUB\_SAFETY + \in$ and the variables are defined as followed.

**Variable Definitions and Hypotheses**

Buyers were asked if they currently purchased locally produced food products. The reported response was the binary dependent variable in the model. The variable, BUYLOCAL, equals one if the buyer currently purchases local food products, and equals zero if the buyer does not currently purchase local food products.

Table 1 on the next page shows the means and standard deviations of the seven explanatory variables included in this empirical model. These variables include buyer classification, perceived operational challenges for buying local food, perception of local food in general, and food safety requirements for food offered through a food hub. Explanatory variables within the model were chosen based on existing literature on buyer local food requirements and interest.

Five of the seven explanatory variables within the model are composite variables created based on a factor analysis. This analysis allowed twenty Likert scale questions from the survey to be combined into five variables included in the model. The composite variables each contain questions asked within the survey had high correlations (>.50) to one another. The questions used a Likert five-point scale (5 = most important or strongly agree, 1 = not important at all or strongly disagree).

Table 1. Logit regression model independent variable definitions

| Variable | Range | Description | Mean | Std. Dev. | Comment (Survey Q) |
|---|---|---|---|---|---|
| BUS_TYPE | 0 or 1 | = 0 if intermediated<br>= 1 if institution | .3652 | N/A | |
| PRICE | 0 or 1 | = 1 if "agree" or "strongly agree" price is a challenge to purchasing local<br>= 0 if "neutral," "disagree" or "strongly disagree" price is a challenge | .6300 | N/A | Binary Variable (Appendix A Q16j) |
| OPER_CHAL | 4 – 20 | Perceived challenges with acquiring local food | 14.14 | 3.50 | Composite variable (Appendix A Q16f-i) |
| CAPACITY | 4 – 20 | Perceived challenges with offering local food | 15.32 | 3.03 | Composite variable (Appendix A Q16a-b,d-e) |
| LOCAL_IMPACT | 4 – 20 | Current perception of local food on the economy | 17.45 | 2.46 | Composite variable (Appendix A Q18 c-f) |
| EATING_LOCAL | 2 – 10 | Current perception of consuming local food | 8.13 | 1.36 | Composite variable (Appendix A Q18a-b) |
| HUB_SAFETY | 6 – 30 | Important safety features for a food hub to require of producers as indicated by buyers | 25.58 | 4.28 | Composite variable (Appendix A Q25) |

Two variables in the model were simple binary variables. *Bus_Type* was 1 if the respondent was an institution; and 0 otherwise (intermediated). Institutions, for this survey, were considered healthcare institutions, governmental institutions, K-12 schools, and other academic institutions (universities). Just fewer than seventy percent of the respondents were intermediated buyers. *Price* was 1 if a respondent "strongly agreed" or

"agreed" that price was a challenge to promoting locally produced food products; 0 if a respondent was "neutral," "disagreed" or "strongly disagreed." Approximately 63% of all respondents fell into category 1, leaving the remaining 37% for category 0.

The remaining five variables are all composites found through the factor ananlysis done on the Likert scale questions. *Oper_Chal* included questions on challenges buyers perceived in acquiring locally produced food products, including: packing issues, transportation, lack of food safety certification, and not knowing where to source from. The range on each question was 1-5 (1 being strongly disagree; 5 being strongly agree), making the overall range of the composite variable 4 – 20. On average, the respondents reported a composite score of 14.09.

*Capacity* was comprised of questions on challenges buyers perceived in offering locally produced food products, including: lack of volume from individual producers, overall lack of supply, seasonality, and producer communication and relationship. The range on each question is 1-5 (1 equals strongly disagree; 5 equals strongly agree), making the overall range of the composite variable 4 – 20. On average, the respondents reported a composite score of 15.30.

*Local_Impact* included questions on buyers' current perception of local food on the economy make up this composite variable, including: local foods promote local farmers, they improve the local economy, they help sustain the environment, and they reduce the carbon footprint. The range on each question is 1-5 (1 equals strongly disagree; 5 equals strongly agree), making the overall range of the composite variable 4 – 20. On average, the respondents reported a composite score of 17.50.

*Eating_Local* is comprised of two questions on buyers' perception of consuming local food, including: local food products taste better, and are safe to eat. The range on each question is 1-5 (1 equals strongly disagree; 5 equals strongly agree), making the overall range of the composite variable 2 – 10. On average, the respondents reported a composite score of 8.13.

*Hub_Safety* was the largest composite variable as it covered buyers' perception of important safety features for a food hub to require of producers make up this composite variable. These questions include: the hub is supplying fresh produce from food safety certified farms, is supplying fresh produce from GAP and/or GHP certified farms, is HACCP certified, carries liability insurance, food safety and facility conditions, and traceability of foods. The range on each question is 1-5 (1 equals not important at all; 5 equals very important), making the overall range of the composite variable 6 – 30. On average, the respondents reported a composite score of 25.64.

Table 2 below shows predicted signs of the independent variables included in the logit regression model. Based on previous studies, BUS_TYPE is the expected to be negative. Strohbehn (2002) created a survey for institutions and restaurants to complete pertaining to their obstacles with purchasing locally grown food products. Shrohbehn's research showed institutions are interested in purchasing local products but had more of a challenge doing so. OPER_CHAL was predicted to be negative based on Strohbehn's 2002 data also showing that buyers had more challenges with multiple vendors, consistent packaging, food safety, and timely delivery. Brimlow's (2015) research thirteen years later looking into institutional vs intermediated buyers, showed that institutions had stricter food security requirements as well as a higher need for

supply/delivery convenience in the local food procurement. PRICE was predicted to be negative based on the research from Einsen (2010) and Conner (2011). Einsen reported hospitals being cost conscious and Conner found that school's importance of nutrition is limited by their budget. Hardesty's (2008) ordered logit model research showed significance in institutions seeing challenges with year-round availability and multiple vendors, which is why CAPACITY was predicted to be negative.

LOCAL_IMPACT was expected to be positive because the idea of a buyer being able to make a difference in the community and environment was shown to be the greatest positive impact for Hardesty's (2008) logit model. EATING_LOCAL was also predicted to be positive because of the idea that as a buyer believed locally produced food products to be safe and taste better, they would be more likely to purchase them. Finally, HUB_SAFETY was predicted to be positive because as a hub required more from its producers, it would take that responsibility off buyers, making purchases easier.

Table 2. Prediction of signs on independent variables in logit model regression

| Independent Variable | Expected Sign |
|---|---|
| BUS_TYPE | - |
| PRICE | - |
| OPER_CHAL | - |
| CAPACITY | - |
| LOCAL_IMPACT | + |
| EATING_LOCAL | + |
| HUB_SAFETY | + |

# RESULTS

## Descriptive Results

A sample of 115 buyers from various food industry sectors completed the survey through online or in person interviews. Of the 115 completed surveys, 73 (63.5%) were intermediated buyers, while 42 (36.5%) were institutional buyers. The distribution of buyers is shown in Table 3 below. Those businesses classified as "other foodservice" consisted of gas stations and catering businesses. The one "other non-foodservice" business was a hotel with a reception hall for catering.

Table 3. Classes of buyers who completed the survey

| Type of Business | Frequency | Percent |
|---|---|---|
| Restaurant – Chain | 11 | 9.6 |
| Restaurant - Independent | 29 | 25.2 |
| Grocery - Chain | 10 | 8.7 |
| Grocery - Independent full line store | 10 | 8.7 |
| Grocery - corner store | 5 | 4.3 |
| Distributor - braodline | 1 | 0.90 |
| Institution - Healthcare | 7 | 6.1 |
| Institution - K to 12 schools | 30 | 26.1 |
| Institution - Other academic | 3 | 2.6 |
| Other Foodservice | 7 | 6.1 |
| Other non-foodservice | 1 | 0.90 |
| Total | 115 | 100.0 |

Of the 115 respondents, 74 (64.3%) were currently purchasing local food (BUYLOCAL = 1), and the other 41 (35.7%) were not purchasing local products (BUYLOCAL = 0) at the time of survey. Overall, fewer institutional buyers were currently purchasing local food products (28%) compared to intermediated buyers (72.6%). Two-thirds of buyers spent less than $100,000 on total products sold, with local purchases typically less than 10% of the total.

Buyers obtain their local produce from a variety of suppliers. A single buyer will typically use multiple sources. As can be seen in Table 4 below, institutional and intermediated buyers predominantly source food from wholesalers and distributors. Almost 93% of institutions purchased from wholesalers and distributors whereas only 85% of intermediated buyers purchased from these sources. Local farmers delivered more of their local products to intermediated buyers (45.2%) compared to institutional buyers (31%). The other sources selected by buyers was not specified when the survey was completed.

Table 4. Percent of buyers who selected the following types of suppliers for food purchases. Buyers could select all that applied

| Type of Supplier | Intermediated | Institutional | Total |
|---|---|---|---|
| Farmers | 45.2 | 31.0 | 40.0 |
| Processors | 23.3 | 19.0 | 21.8 |
| Wholesale/Distributors | 84.9 | 92.9 | 87.8 |
| Farm Auctions | 11.0 | 0.0 | 7.0 |
| Brokers | 9.6 | 11.9 | 10.4 |
| Others | 8.2 | 4.8 | 7.0 |

"Locally produced" is generally defined as the production and marketing of food products within a certain geographic proximity of farmers and consumers. Just over half of the buyers surveyed considered producers located within less than 100 miles of the buyers as those supplying locally produced food products. A little more than 20% considered products produced within the state as local. Regardless of the specific definition of "local," 79% of the buyers expected a growing demand for locally produced food products. Fresh produce of high demand indicated by the buyers included tomatoes, apples, and greens including lettuce, free-range eggs, sweet corn and cucumbers.

Buyers were asked whether there were any fresh or value-added products they would like to source locally but were having difficulty doing so. Table 5 above shows buyers would have liked to source fresh vegetables and melons the most but also found them the most difficult to obtain. The buyers also reported fresh fruits, fresh cut produce, meat and canned and preserved food including honey as among the most desired locally produced food. Other produce included prewashed lettuce, mushrooms, persimmons, wild berries, paw paws and winter tomatoes. Dairy products, including yogurt, were among the least desired of buyers to source and having difficulties doing so. Institutional buyers were typically not different from intermediated buyers in reporting that various types of produce were desired but a challenge to source. Two exceptions were for fresh fruit and cheese. For example, more than 70% of the institutional buyers reported procuring locally produced fresh fruits was challenging, compared to only 39.4% of intermediated buyers.

Table 5. Percent of buyers who reported having difficulty sourcing fresh produce and meat products but would like to source them

| Product | Intermediated | Institutional | Total |
|---|---|---|---|
| Fresh vegetables and melons | 47.9 | 64.3 | 54.0 |
| Fresh fruit** | 39.4 | 71.4 | 51.3 |
| Pre-cut produce | 25.4 | 31.0 | 27.4 |
| Meat | 23.9 | 31.0 | 26.5 |
| Eggs | 18.3 | 28.6 | 22.1 |
| Canned and preserved food including honey | 15.5 | 28.6 | 20.4 |
| Cheese* | 25.4 | 11.9 | 20.4 |
| Fluid milk | 18.3 | 11.9 | 15.9 |
| Poultry | 14.1 | 19.0 | 15.9 |
| Cider/juice | 14.1 | 11.9 | 13.3 |
| Baked goods/bread | 12.7 | 9.5 | 11.5 |
| Other dairy | 15.5 | 4.8 | 11.5 |
| Other Produce | 14.3 | 4.8 | 10.7 |
| Yogurt | 11.3 | 9.5 | 10.6 |

* chi-square significant at $p<0.10$; ** chi-square significant at $p<0.05$;

In general, buyers tended to have challenges to overcome in order to source local food in their businesses (Table 6). For both intermediated and institutional buyers, there were challenges in receiving enough produce from a single producer and keeping open communication and relationships with farmers. In addition, consistent quality, seasonality, and price were universal challenges. However, institutional buyers saw more issues with overall supply, lack of food safety certifications, transportation, and packing issues. Institutional buyers also indicated they were unsure where to source local food more so than intermediated buyers.

Table 6. Percentage of buyers who agree or strongly agree the following issues are a challenge in procuring local food products

| Challenge | Intermediated | Institutional | Total |
|---|---|---|---|
| Overall lack of supply*** | 58.3 | 83.3 | 67.5 |
| Lack of volume from individual producers | 66.7 | 73.2 | 69.0 |
| Inconsistent lack of quality | 41.7 | 50.0 | 44.7 |
| Seasonality | 75.3 | 78.6 | 76.5 |
| Producer communication and relationships | 51.4 | 57.1 | 53.5 |
| I don't know where to source from* | 43.1 | 61.9 | 50.0 |
| Transportation*** | 45.1 | 73.2 | 55.4 |
| Lack of food safety certification** | 46.5 | 69.0 | 54.9 |
| Packing issues** | 35.2 | 54.8 | 42.5 |
| Price | 65.3 | 56.1 | 61.9 |

* chi-square significant at $p<0.10$; ** chi-square significant at $p<0.05$;
*** chi-square significant at $p<0.01$

Not only were buyers asked what challenges they had with local food products but also their perceptions of local. Table 7 shows the benefits of local buyers saw in promoting local farmers and economy to be the most acclaimed perceptions. Overall, there were no differences between institutional and intermediated buyers on their perceptions of local food products.

When considering food safety and packing requirements, almost all buyers required suppliers to comply with some form of food safety and packing requirements. Table 8 on the next page shows the different food safety and packaging requirements of buyers. Only 13% and 10.4% of buyers did not require any food safety or packing requirements, respectively. Good Agricultural Practices (GAP) and/or Good Handling

Table 7. Percentages of buyers who agree or strongly agree about perceptions regarding local food products

| Perceptions | Intermediated | Institutional | Total |
|---|---|---|---|
| They promote local farmers | 95.9 | 95.2 | 95.7 |
| They promote local economy | 95.9 | 95.2 | 95.7 |
| They help sustain the environment | 78.1 | 76.2 | 77.4 |
| Locally produced food products taste better | 75.3 | 81.0 | 77.4 |
| They are safe to eat | 69.9 | 76.2 | 72.2 |
| They reduce carbon foot print | 62.5 | 73.8 | 66.7 |

practices (GHP), along with Hazard Analysis Critical Control Point (HACCP) certification and traceability were among the top requirements. Institutional buyers had a higher requirement (57.1%) for HACCP than intermediated buyers (31.5%). On the other hand, more intermediated buyers (24.7%) required suppliers to pass an on-farm audit than institutional buyers (11.9%).

Nearly 90% of the buyers reported having some form of packing requirements. While a majority (54.8%) wanted their suppliers to follow USDA grading standards, nearly half of the buyers depended on the standards of distributors and suppliers. A few intermediated buyers preferred recyclable or reusable packaging but none of the institutional buyers indicated that was important.

Liability insurance requirements were another area in which differences appeared among buyers. While 50% of the buyers reported their requirements for the growers were the same as those used by their wholesaler or distributor, only 28% reported that they did not require any. However, many buyers indicated they would recommend some form of liability insurance requirement in the future. Others felt confident about the growers they

Table 8. Percentage of buyers with food safety and packaging requirements. Buyers could select more than one answer

| | Intermediated | Institutional | Total |
|---|---|---|---|
| Food safety requirements of buyers | | | |
| Must be GAP/GHP certified | 42.5 | 47.6 | 44.3 |
| Must be HACCP certified*** | 31.5 | 57.1 | 40.9 |
| Must offer traceability | 38.4 | 45.2 | 40.9 |
| Must have on-farm food safety plan | 34.2 | 38.1 | 35.7 |
| Must pass on-farm audit* | 24.7 | 11.9 | 20.0 |
| Other | 21.9 | 14.3 | 19.1 |
| None | 16.4 | 7.1 | 13.0 |
| Food packing requirements of buyers | | | |
| Must follow USDA grading standards*** | 45.2 | 71.4 | 54.8 |
| We depend on our distributor/suppliers' standards | 46.6 | 47.6 | 47.0 |
| Must meet our quality specifications | 35.6 | 35.7 | 35.7 |
| Must maintain cold chain | 23.3 | 31.0 | 26.1 |
| Must meet our own packing specifications | 23.3 | 11.9 | 19.1 |
| None | 12.3 | 7.1 | 10.4 |
| Must be recyclable or reusable packaging** | 9.6 | 0.0 | 6.1 |

* chi-square significant at p<0.10; ** chi-square significant at p<0.05;
*** chi-square significant at p<0.01

sourced from, such as the Amish community. The data also shows 88% of institutions required liability insurance whereas only 72% of intermediated buyers required liability insurance (p<.05). Buyers who required some form of liability insurance (19.1%) different from wholesalers and distributors specified a range of coverage of $250,000 to $5 million.

Other aspects were important to a buyer when considering purchasing local food from a food hub (Table 9). There were more institutional buyers (69%) than intermediated (61.6%), but 64.3% of all buyers indicated an interest in purchasing food

from a food hub in south central Missouri. All buyers saw an importance in low prices/affordability of high quality products with food safety certifications. In addition, buyers wanted a hub conveniently located with a variety of products.

When considering purchasing from a food hub, institutional buyers had a greater need for the hub to take on more of the attributes than intermediated buyers. HACCP certification as well as food safety and facility condition with liability insurance was seen as more important to institutional buyers as opposed to intermediated buyers. In addition to safety certifications, institutional buyers (97.6%) had a greater need for reliable delivery services compared to intermediated buyers (86.1%). This goes hand in hand with the ease of ordering these products and traceability of the food products sold through a food hub ($p<.10$). In the case of value-added products, institutional buyers (57.1%) would need more pre-cut produce than intermediated buyers (38.6%).

Table 9. Percentage of buyers who consider the following hub attributes very important or somewhat important when deciding to purchase through a food hub

| Hub Attribute | Intermediated | Institution | Total |
|---|---|---|---|
| Lower prices/Affordability | 88.9 | 88.1 | 88.6 |
| High quality products | 94.4 | 97.6 | 95.6 |
| Offers pre-cut local produce* | 38.6 | 57.1 | 45.5 |
| Convenient location | 79.7 | 81.0 | 80.2 |
| Reliable delivery service** | 86.1 | 97.6 | 90.4 |
| Ease of ordering products* | 93.1 | 100.0 | 95.6 |
| Traceability of foods* | 80.6 | 92.9 | 85.1 |
| Food safety and facility conditions* | 91.7 | 100.0 | 94.7 |
| Supplying fresh produce from GAP or GHP certified farms | 62.9 | 73.8 | 67.0 |
| Supplying fresh produce from food safety certified farms** | 69.0 | 85.7 | 75.2 |
| Is HACCP certified*** | 55.6 | 82.9 | 65.5 |
| Carries liability insurance** | 72.2 | 88.1 | 78.1 |
| Diversity of products available | 81.9 | 87.8 | 84.1 |

* chi-square significant at $p<0.10$; ** chi-square significant at $p<0.05$; *** chi-square significant at $p<0.01$

**Logit Model Results**

Parameter estimates from a logit model was used to calculate the probability of a buyer's willingness to purchase locally grown food products. The model summary statistics are shown in Table 10, and ß coefficients and the marginal effects (shown in Table 11 below) were obtained using the software package LIMDEP (Limdep Version 8.0 User's Manual, 2002).

Of the 115 respondents who answered the questions related to buying local food products, 74 (64.3%) were purchasing local food (BUYLOCAL = 1), and the remaining 41 (35.7%) were not (BUYLOCAL = 0). The coefficients for LOCAL_IM and HUB_SAFETY were positive and statistically significant at the 5% level. Similarly, the coefficients for BUS_TYPE and OPERATCH were negative and statistically significant at the 5% level. The marginal effects for these variables suggest institutional buyers are 25% less likely to buy local than intermediated buyers. Buyers who believe there are more challenges in acquiring local food products are 4% less likely to purchase local food products than those who did not believe there to be as many challenges to purchasing local food.

Food buyers who believe local food has a larger impact on society were 6% more likely to purchase local food than those buyers who did not see local food as having much of an impact on society. Likewise, as a food hub has more requirements and safety regulations for its producers, buyers are 3% more likely to purchase local food from a food hub.

Table 10. Logit model statistics

| Model Statistics | | Predicted | | | |
|---|---|---|---|---|---|
| McFadden Pseudo R-squared | 0.17 | Actual | 0 | 1 | Total |
| Chi squared | 22.64*** | 0 | 17 | 18 | 35 |
| Degrees of freedom | 7 | 1 | 7 | 65 | 72 |
| % correctly predicted | 77% | Total | 24 | 83 | 107 |

*** chi-square significant at p<0.01

Table 11. Estimated coefficients and marginal effects accompanied with p-values of independent variables on willingness to purchase local food products

| Variable | Coefficient | p-value | Marginal effect | p-value |
|---|---|---|---|---|
| Constant | -3.904 | 0.14 | - | - |
| BUS_TYPE | -1.189 | 0.03 | -0.252 | 0.03** |
| PRICENEW | 0.028 | 0.96 | 0.006 | 0.96 |
| OPERATCH | -0.210 | 0.04 | -0.043 | 0.04** |
| CAPACITY | 0.040 | 0.66 | 0.008 | 0.66 |
| LOCAL_IMPACT | 0.296 | 0.02 | 0.060 | 0.02** |
| EATING_LOCAL | -0.132 | 0.53 | -0.027 | 0.52 |
| HUB_SAFETY | 0.136 | 0.02 | 0.028 | 0.02** |

** chi-square significant at p<0.05
N=107 due to missing values in the remaining 8 surveys

Using the logit model estimates from the following equation,

$$BUYLOCAL = \frac{e^{\theta}}{1 + e^{\theta}}$$

Where,

$$\theta = \beta_0 + \beta_1 BUS_{TYPE} + \beta_2 PRICENEW + \beta_3 OPERATCH + \beta_4 CAPACITY +$$

$$\beta_5 LOCAL_{IMPACT} + \beta_6 EATING_{LOCAL} + \beta_7 HUB_{SAFETY} + \in$$

the average intermediated buyer within this study was estimated to have a 79% probability of buying local food products. In contrast, the average institutional buyer had only a 54% probability of buying local food products. Comparatively, the most interested buyers (those with the highest scores possible for each independent variable) had an 80% probability of buying local food among intermediated buyers and a 60% probability of buying local food among institutional buyers.

The other three significantly different composite independent variables have separate effects on the probability of a buyer to purchase local food. The effects were simulated by keeping the value of all explanatory variables at their averages except for the variable being analyzed. The explanatory variable being studied began at one and increases to its maximum, as can be seen in Figure 1 below. A buyer who does not see any challenges in procuring local food is 97% likely to purchase local food. However, as a buyer perceives more challenges, the probability of purchasing locally grown food products quickly begins to decline.

A buyer's perception of the impact of purchasing locally grown food products on the local economy has the largest role in a buyer's probability of purchasing local food. When there is no perceived impact, a buyer is only 6% likely to purchase local. At the highest level of perceived impact, the probability of purchasing is at 89%.

A food hub can also have a large effect on the probability of a buyer purchasing local food. When a food hub does not require any food safety certification or liability insurance, a buyer is only 21% likely to purchase local from them. However, as a hub requires more producers, or offers producers the opportunities to acquire certifications, the probability of a buyer purchasing from the hub increases roughly 3% per reported score until it reaches 82% likely of a buyer to purchase local food.

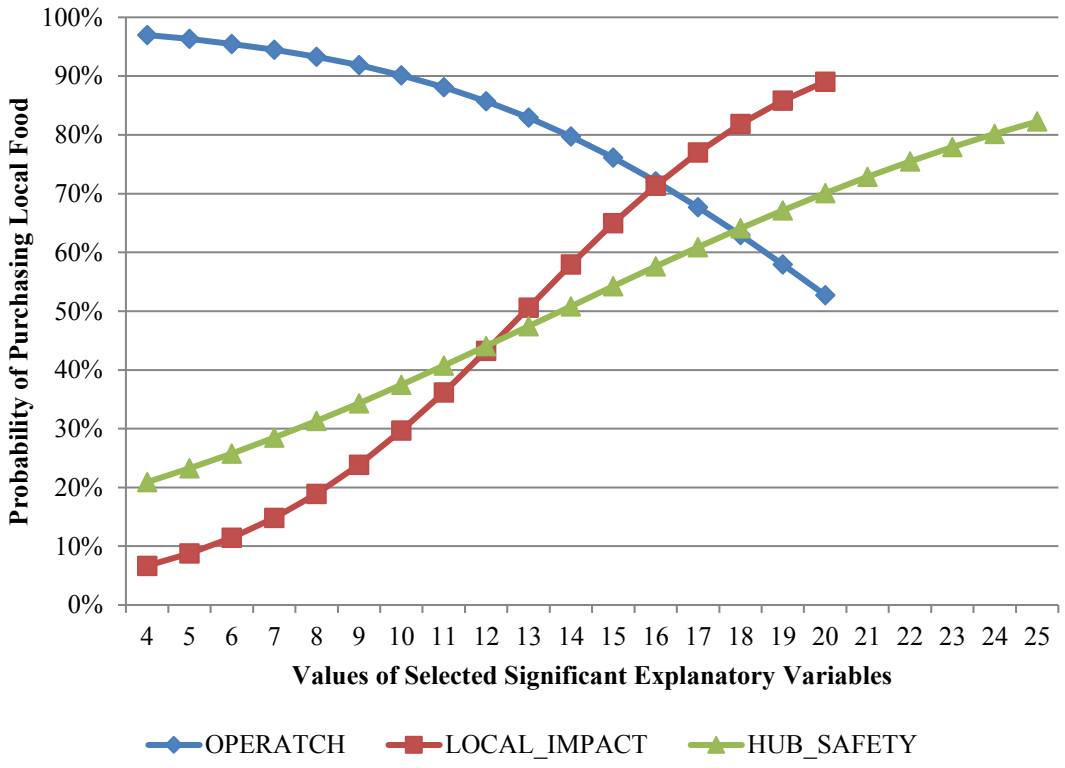


Figure 1. Changes in probability of purchasing local food for each stepwise difference in values of the three significant composite independent variables in the logit regression model, ceteris paribus

## DISCUSSION

The results of this research demonstrate there is a demand for locally grown food products by both institutional and intermediated buyers. These results are consistent with increase in local food sales from 2007 (Low and Vogel, 2011). Also consistent with previous research on institutional buyers, the results show that intermediated buyer demand is higher than that of institutional buyers (Hardesty, 2008).

Missouri buyers who participated in this study had the same general definition of local as the definitions given by the Hartman Group and U.S. Congress in the Food, Conservation, and Energy Act of 2008. For example, in an article written for *USA Today*, Wal-Mart claims local as being within the same state, and most of Whole Foods local producers are no further than two-hundred miles from a store (Schmit, 2008). This shows that the general idea of local among Missouri buyers is similar to national buyers.

A majority of institutional and intermediated buyers rely on wholesalers and distributors for food products and produce. Excessive reliance on these wholesalers could be a primary reason for not as many buyers purchasing local food. A food hub could mitigate this situation by providing larger quantities of local food, serving as a new type of wholesaler.

The reason for the limited demand for local food among institutions could be that they require, in general, more certifications (such as HACCP) and do not perceive supply challenges to meet their current food menu. The increased requirements of institutions are due, in part, to government regulation of those institutions. In addition, the not knowing where to source from could be a consequence of outsourcing the food programs at these institutions.

Reported differences between the two classifications of buyers are consistent with Hardesty's 2008 logit model results in which the attitude in regards to environmental and social values offered the most variability among the decision of buying local produce. In this study, buyer's satisfaction of knowing they are contributing to the health of the environment and society is not highly influenced by price since everyone works on a budget.

It is interesting that price is not a statistically significant variable in the regression model. Previous literature has pointed out that institutions are price conscious, but the results here do not indicate that price is a statistically significant determinant of the choice to buy local food when controlling for other factors. Institutions have a long list of requirements and regulations for the foods they purchase. The results in this study do not suggest that price as important as food safety and effects on the environment.

Although the price variable in the logit model is not statistically significant, this does not mean that price is not important to a buyer. As shown by the chi-squared cross tabulations, price is still seen as a challenge to over half of institutions and intermediated buyers. Therefore, buyers are aware that price is important, but buyers can direct some of the additional cost for local onto their customers, especially intermediated buyers.

With 64.3% of buyers being interested in purchasing from a food hub in south central Missouri, it is important to compare the buyers with the sellers in the area. In a previous study addressing producer interest and willingness to participate in a food hub, it was shown that 67.5% of producers in the south central Missouri region were interested in participating in a food hub (Muzinic, 2015). Both buyers and producers indicated

challenges in connecting with one another on their own. This is where a food hub could help to bridge that gap.

Buyers in this study indicate that they would like to source, but have troubles buying local vegetables, fruits, and animal products. As indicated by the producers in Muzinic's (2015) study, the most popular products in these three categories are currently tomatoes, cucumbers, blackberries, beef, and eggs. Although these products may not be specifically what the buyers desire, Muzinic (2015) showed that younger producers were willing to adjust their supply depending on additional marketing channels including a food hub.

Food hubs could help producers by providing traceability capabilities for their products. Eighty percent of the producers indicated they were willing to set aside a few more hours for improving their record keeping if they received some guidance. This will help to give buyers the satisfaction of knowing that the food is sourced from a specific farm and was safely handled.

Certifications including Good Agricultural practices (GAP) and Good Handling Practices (GHP) will further enhance buyers' likelihood of buying from local producers. Obtaining these certifications can be expensive for a producer, which is why only 68% indicated they were willing to obtain certifications themselves (Muzinic, 2015). When asked if they could receive their certifications for little or no cost, more producers said they would be willing to obtain these certifications. This is potentially a place for extension services to step in and help create an easier way for producers to get their certifications, possibly through GroupGAP programs.

Due to a high number of buyers within Missouri, including corner stores, chain stores, and federal federal prisons, retaining a good estimate of the population size was not feasible. Therefore, the appropriateness of the sample size (115) could not be ascertained. In addition, a self-selection bias may exist in the results due to the selection of convenience rather than random sample. Those who completed the survey may have disproportionately been those already interested in a food hub.

Another limitation was being able to reach all of the buyers needed. Knowing the appropriate respondent for the survey was not easy, especially in the case of institutional buyers. 'Time is money' in the business world, so many do not want to be bothered filling out a survey. In that case, retrieving the proper emails for companies or individuals was difficult.

As with any study, not every aspect of a topic can be covered in one survey. For institutional purchases of local food, examining the operations of local buyers and the regulations they face could assist other institutions wanting to make a move to buying local food. As for food hubs, research on current hubs that supply certifications and liability insurance would be helpful for the many up-and-coming food hubs around the country.

# CONCLUSION

The sales of locally grown food products in the United States have grown in the past few years. More and diversified buyers are purchasing locally produced food products. However, buyers are still facing barriers while sourcing local food. This study examined such barriers among institutional and intermediated buyers. The barriers included seasonality, price, and keeping communication and relationships with the producers. Programs and policies addressing the perceived barriers will stimulate growth in the locally produced food industry.

The study identified a significant difference between institutional and intermediated buyers in their likelihood of buying local. Since institutional buyers are less likely to purchase locally produced food products than the intermediated buyers, lowering of the barriers is expected to have greater impacts on institutional buyers. There were more institutions that required more HACCP (food safety) certification as well as liability insurance, transportation, packing, supply, and not knowing where to source from. This could be where a local food hub in south central Missouri could play the role.

While both byers and producers have shown interest in participating in a food hub, more research is needed to identify the best model for in south central Missouri.

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## APPENDICES

### Appendix A. Survey Instrument

1. **Please select one of the following to indicate the type of your business:**

| | | | |
|---|---|---|---|
| ☐ Restaurant-Chain | ☐ Restaurant-Independent | ☐ Grocery - Chain | ☐ Grocery – Independent full line store |
| ☐ Grocery-Corner store | ☐ Distributor-Broadline | ☐ Distributor – Specialty Produce | ☐ Institution - Healthcare |
| ☐ Institution - Governmental | ☐ Institution - Corporate | ☐ Institution – K to 12 schools | ☐ Institution – Other Academic |
| ☐ Other Foodservice (Describe) | ☐ Other Non-foodservice (Describe) | Comment:_____ _____ | |

**If you selected <u>K to 12 schools</u> above, please complete Q2, if not go to Q5 and continue.**

2. **Do you supplement the school food programs with fresh vegetables and fruits grown in your school?** □ Yes□No

3. **If yes, what was the estimated land area** in production in 2014? (complete the ones that are appropriate to your school)

   a._____Acres b._____Sq. ft. (garden plots) c._____Sq. ft. (high tunnel/greenhouse)

4. **List top three vegetables/fruits that were grown and used in supplementing the school food programs.**

| |
|---|
| **1.** |
| **2.** |
| **3.** |

5. **Types of suppliers of fresh produce, meat, and dairy products**

| **Type** | **Check those apply** |
|---|---|
| Farmers | ☐ |
| Processors | ☐ |
| Wholesale/Distributors | ☐ |
| Farm Auctions | ☐ |
| Brokers | ☐ |
| Others (Specify)_____ | ☐ |

6. **Do you buy locally produced food products?** □ Yes□No

7. **If the answer to 6 is "Yes", what percentage of the total food products that you sell in your business is produced locally?**

| | | | | |
|---|---|---|---|---|
| ☐ < 10% | ☐ 10 to 19% | ☐ 20 to 29% | ☐ 30 to 39% | ☐ 40-49% |
| ☐ 50 to 59% | ☐ 60 to 69% | ☐ 70 to 79% | ☐ 80 to 89% | ☐ 90 to 100% |

8. **If the answer to 6 is "Yes", how do you procure your locally produced food products (Check those apply)?**

| **Farmers deliver to us** | **We pick up from farmers** | **Farmers deliver to the aggregation point** | **Other distributors** | **Other ways (Specify):** |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

9. **What is your total annual purchasing volume of fresh fruits and vegetables?**

| | | |
|---|---|---|
| ☐ Less than $5,000 | ☐ $5,000 to 10,000 | ☐ $10,000 to $20,000 |
| ☐ $20,000 to $40,000 | ☐ $40,000 to $100,000 | ☐ $100,000 to $150,000 |
| ☐ $150,000 to $200,000 | ☐ $200,000 to $250,000 | ☐ $250,000 to $300,000 |
| ☐ $300,000 to $400,000 | ☐ $400,00 to $500,000 | ☐ Above $500,000 |

10. **What percentage of your annual fresh fruit and vegetable purchases is local?**

| | | | | |
|---|---|---|---|---|
| ☐ < 10% | ☐ 10 to 19% | ☐ 20 to 29% | ☐ 30 to 39% | ☐ 40-49% |
| ☐ 50 to 59% | ☐ 60 to 69% | ☐ 70 to 79% | ☐ 80 to 89% | ☐ 90 to 100% |

11. **What percentage of your annual fresh fruit and vegetable purchases is pre-cut?**

| | | | | |
|---|---|---|---|---|
| ☐ < 10% | ☐ 10 to 19% | ☐ 20 to 29% | ☐ 30 to 39% | ☐ 40-49% |
| ☐ 50 to 59% | ☐ 60 to 69% | ☐ 70 to 79% | ☐ 80 to 89% | ☐ 90 to 100% |

12. **Do you believe that there is a growing demand for the locally produced food products among your consumers?**□ Yes□No

13. **Can you name the top three locally produced food products for which you expect the greatest increase in demand over the next years?**

a._____

b. _____

c._____

14. **Within what radius (in miles) do you consider locally grown?**

| 1-50 | 50-100 | 100-150 | 150-200 | State wide |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

15. **Are there any fresh or value added products you would like to source from locally but having difficulty doing so? (Check all that apply)**

| Product | Difficulty sourcing |
|---|---|
| Fresh vegetables and melons | ☐ |
| Fresh fruit | ☐ |
| Fresh cut produce | ☐ |
| Fluid milk | ☐ |
| Cheese | ☐ |
| Yogurt | ☐ |
| Other dairy | ☐ |
| Eggs | ☐ |
| Poultry | ☐ |
| Meat | ☐ |
| Baked goods/bread | ☐ |
| Canned and preserved food including honey | ☐ |
| Cider/Juice | ☐ |
| Other (Specify):_____ | ☐ |

16. **How strongly do you feel about the following challenges in promoting locally produced food products?**

| Challenges | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| a.Overall lack of supply | ☐ | ☐ | ☐ | ☐ | ☐ |
| b.Lack of volume from individual producers | ☐ | ☐ | ☐ | ☐ | ☐ |
| c.Inconsistent quality | ☐ | ☐ | ☐ | ☐ | ☐ |
| d.Seasonality. | ☐ | ☐ | ☐ | ☐ | ☐ |
| e.Producer communication and relationships | ☐ | ☐ | ☐ | ☐ | ☐ |
| f.I don't know where to | ☐ | ☐ | ☐ | ☐ | ☐ |

| Challenges | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| source from | | | | | |
| g.Transportation | ☐ | ☐ | ☐ | ☐ | ☐ |
| h.Lack of food safety certification | ☐ | ☐ | ☐ | ☐ | ☐ |
| i.Packing issues | ☐ | ☐ | ☐ | ☐ | ☐ |
| j.Price | ☐ | ☐ | ☐ | ☐ | ☐ |
| Others (specify): | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ |

**17. How strongly do you feel about the following ways of promoting locally produced food products?**

| Ways of Promoting | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Large hanging ceiling signs to let the shoppers at the stores know about the availability of the products. | ☐ | ☐ | ☐ | ☐ | ☐ |
| "Buy locally produced food product" sign at the check-out counters. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Sampling tables at the grocery stores for locally grown food products. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Locally produced food products identified on the receipts. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Buyers placing "buy local" advertising flyers in the local newspapers. | ☐ | ☐ | ☐ | ☐ | ☐ |

**18. Your perception of locally produced food products are:**

| Perceptions | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| a.Locally produced food products taste better | ☐ | ☐ | ☐ | ☐ | ☐ |
| b.They are safe to eat | ☐ | ☐ | ☐ | ☐ | ☐ |
| c.They reduce carbon foot print | ☐ | ☐ | ☐ | ☐ | ☐ |
| d.They help sustain the environment | ☐ | ☐ | ☐ | ☐ | ☐ |
| e.They promote local farmers | ☐ | ☐ | ☐ | ☐ | ☐ |
| f.They promote local economy | ☐ | ☐ | ☐ | ☐ | ☐ |

19. **What are your requirements of the distributors or fresh produce suppliers you purchase from in terms of *food safety*? Choose all that apply**.

| |
|---|
| ☐ None |
| ☐ Must pass our on-farm audit |
| ☐ Must have on-farm food safety plan |
| ☐ Must be Good Agricultural Practices (GAP) and/or Good Handling Practices (GHP) certified |
| ☐ Must be Hazard Analysis Critical Control Points (HACCP) certified |
| ☐ Must offer traceability |
| ☐ Other (specify)_____ _____ |

20. **What are your requirements of the growers or fresh produce suppliers you purchase from in terms of *liability insurance*?**

| |
|---|
| ☐ Not required |
| ☐ Required – Please list minimum coverage amount below |
| ☐ We depend on our distributor/suppliers' requirements |
| Comment: |

21. **What are your requirements of the distributors or fresh produce suppliers you purchase from in terms of *packing standards*? Choose all that apply.**

| |
|---|
| ☐ None |
| ☐ Must follow USDA grading standards |
| ☐ Must meet our own packing specifications |
| ☐ Must meet our quality specifications |
| ☐ Must maintain cold chain |
| ☐ Must be recyclable or reusable packaging |
| ☐ We depend on our distributor/suppliers' standards |

22. **Are there any current efforts in Southwest Missouri that you know of to coordinate farmers and help with aggregation, processing, marketing and distribution?**

□ Yes□No

23. **If Yes, explain**_____

**24. How interested would you be in buying through a Food Hub in Southwest Missouri?**

| | Very Interested | Interested | Neutral | Uninterested | Very Uninterested |
|---|---|---|---|---|---|
| **Level of Interest** | ☐ | ☐ | ☐ | ☐ | ☐ |

**25. Rate the following factors in terms of their importance in your buying decisions from the proposed Food Hub:**

| Hub attributes | Very important | Somewhat important | Neutral | Somewhat unimportant | Not important at all |
|---|---|---|---|---|---|
| a.Lower Prices/ Affordability | ☐ | ☐ | ☐ | ☐ | ☐ |
| b.High quality products | ☐ | ☐ | ☐ | ☐ | ☐ |
| c.Offers pre-cut local produce | ☐ | ☐ | ☐ | ☐ | ☐ |
| d.Convenient location | ☐ | ☐ | ☐ | ☐ | ☐ |
| e.Reliable delivery service | ☐ | ☐ | ☐ | ☐ | ☐ |
| f.Ease of ordering products | ☐ | ☐ | ☐ | ☐ | ☐ |
| g.Traceability of foods | ☐ | ☐ | ☐ | ☐ | ☐ |
| h.Food safety and facility conditions | ☐ | ☐ | ☐ | ☐ | ☐ |
| i.Is supplying fresh produce from GAP/ or GHP certified farms | ☐ | ☐ | ☐ | ☐ | ☐ |
| j.Is supplying fresh produce from food safety certified farms | ☐ | ☐ | ☐ | ☐ | ☐ |
| k.Is HACCP certified | ☐ | ☐ | ☐ | ☐ | ☐ |
| l.Carries liability insurance | ☐ | ☐ | ☐ | ☐ | ☐ |
| m.Diversity of products available | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other (Specify): | ☐ | ☐ | ☐ | ☐ | ☐ |

**26. If you were to buy through a Food Hub in South Central MO, what products do you think you would buy through such facility? (Check all that apply)**

| Product | Check that applies |
|---|---|
| Fresh vegetables and melons | ☐ |
| Fresh fruit | ☐ |
| Fresh cut produce | ☐ |
| Fluid milk | ☐ |
| Cheese | ☐ |
| Yogurt | ☐ |
| Other dairy | ☐ |
| Eggs | ☐ |
| Poultry | ☐ |
| Meat | ☐ |
| Baked goods/bread | ☐ |
| Canned and preserved food including honey | ☐ |
| Cider/Juice | ☐ |
| Other (Specify): | ☐ |

**27. What are the top fresh fruit, vegetables, dairy, poultry and meat products you are interested in sourcing locally? Please list the below in priority order and indicate monthly purchase using up to 50 characters in the given box?**

*Example*: Romaine – pre-cut -20 cases/mo
*Example*: Peaches – whole – 20 cases/mo

Priority 1:
_____

Priority 2:
_____

Priority 3:
_____

Priority 4:
_____

Priority 5:
_____

**28. Would you be willing to participate in a grower/buyer meeting or follow-up interview to discuss the development of the food hub?**

☐ Yes ☐ No

**29. Please provide your contact information below:**

**First Name**:_____

**Last Name**:_____

**Job Title**:_____

**Company Name**:_____

**Work Phone**:_____

**Email Address**:_____

**Address1**:_____

**Address2**:_____

**County:**_____

**Postal Code**:_____

## Appendix B. Human Subjects IRB Exemption

**To**: Arbindra Rimal
Agriculture - SPFD
901 S. National Ave. Springfield MO 65897-0027

**From**: MSU IRB

**Date**: 10/23/2014

**RE**: Notice of IRB Exemption
**Exemption Category**: 2.Survey, interview, public observation
**Study #:** 15-0163

**Study Title**: Feasibility Study of a Food Hub

This submission has been reviewed by the Missouri State University IRB and was determined to be exempt from further review according to the regulatory category cited above under 45 CFR 46.101(b).

**Study Description:** The study will assess the capacity of Southwest Missouri region comprising 9 counties to support a local food hub including Douglas, Howell, Ozark, Texas, Oregon, Shannon, Ripley, Webster and Wright. A food hub, in this case, is defined as a centrally located facility that has a management structure to facilitate the aggregation, storage, processing, and distribution of locally produced (produced within the region) food products. This study will also estimate direct, indirect, and induced effects of economic stimulus through the proposed food hub in the form of income, employment and value added generation.

**Investigator's Responsibilities:**

If your study protocol changes in such a way that exempt status would no longer apply, you should contact the above IRB before making the changes.