Local Food Vitality Index:
Measuring Consumer Attitudes toward Food System Attributes

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Abstract

A local food system vitality index is estimated based on resident consumer performance measures over an array of food market channels, community engagement, and promotion effectiveness. An index is created for individual elements and for the local food system overall. A survey examined consumer performance measures for Lexington, Kentucky, with additional reference to evaluating recent previous communities of these consumers. The resulting index allows food systems participants and economic development interests to gain a resident consumer perspective of what elements are working well but also determine how individual elements might contribute to the overall score provided for the community in question.

Keywords: index, local food, performance

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Introduction

Local food systems (LFS) are complex networks of markets, institutions, and community values (Feagan, 2007; Hinrichs, 2000; Selfa and Qazi, 2005). Understanding the actual performance of such networks is confounded by numerous measurement and interaction complexities. Despite these challenges, many development organizations—such as the Southern Risk Management Education Center and the Southern Rural Development Center—have called for or are engaging in efforts to better understand and measure these systems (Goodwin, 2013; Palma et al., 2013; Lamie et al., 2013). The recent development of *The Economics of Local Food Systems Toolkit* by Thilmany McFadden et al. (2016) is one response to the need to measure economic impacts of local food initiatives (Hughes and Boys, 2015). Because stakeholders in different LFS have different priorities and criteria for what constitutes an active, healthy food system, it is critical to develop a tool to evaluate a robust set of LFS components. This article describes the ongoing creation of a *Local Food System Vitality Index*, which measures the performance of LFS components based consumer perceptions of the LFS in Lexington, Kentucky.

In 2015, the local food coordinator in the Lexington-Fayette Urban County Government office in Lexington, Kentucky, commissioned a demand systems study for local food among buyers and producers in various market channels. Rossi and Hyden (2015) conducted over 60 interviews with food buyers and producers to identify the assets and barriers to expanding the local food economy in central Kentucky. In 2016, the same organization, along with a community-economic development non-profit, asked for an assessment of the state of processing infrastructure in central Kentucky (Brislen, Rossi, and Stancil, 2016).

These two efforts were critical to identifying how well certain LFS components met the expectations of various stakeholders and where potential growth opportunities existed. They also noted LFS components that residents valued but which were felt to be underdeveloped. These studies were quite time intensive and led us to recognize the utility of developing a quantitative and somewhat generalizable process or tool that could more quickly measure the state of our LFS from a resident consumer perspective. This tool could be used to explore the complexities of an LFS in component interaction and examine performance changes over time.

We propose the development of a Local Food System Vitality index. While a few existing indices attempt to quantify local food activity, they generally rely on secondary data, are only applicable to specific geographic regions, and overvalue the quantity rather than the quality of LFS components (Ricketts Hein, Ilbery, and Kneafsey, 2006; Benedek and Balázs, 2014; Locavore Index, 2015). Subsequently, most economic and place-based indices provide little useable information for LFS producers, facilitators, and consumers. Index data are too coarse-grained to capture novel social arrangements and consumer preferences that would be useful for developing LFS production and distribution strategies.

Our index addresses these issues by measuring 20 different components of LFS performance. By focusing on how residents in specific communities understand and value different LFS components, our index provides meaningful information on where investments in the community might effectively be made. As each LFS has geographically distinct features, challenges, and

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opportunities, we expect that different communities place will evaluate their LFS uniquely. The index is designed to help LFS market participants and development entities identify relative performance measures for the community in question, both overall and in its component parts.

Methodology

The index model is based on consumer perception of overall and component LFS performance. LFS components model were identified through qualitative interviews with Lexington-area producers, distributors, and buyers and consumer focus groups. Two focus groups were asked to identify and rate the aspects of the LFS that were most important to them. We provided a short list, but they discussed additional components they considered critical to a creating a strong, vibrant LFS. We refined these responses to reflect 20 components of an LFS most valued by participants. We then developed a web-based survey that asked participants to "Rate the functioning of the following aspects of your food scene" on a 1–5 Likert scale ("Extremely Poor"= 1, "Poor" = 2, "Average" = 3, "Good" = 4, and "Excellent" = 5). "Don't Know" responses scored as 1 for regressions but were omitted in index calculations.

Components were classified as belonging to one of three main categories: i) food market channel components, ii) community engagement components, and iii) local food promotion components (Table 1). These components are evaluated on their own and as potential determinants in a regression for variations in the overall community vitality ratings. Additionally, survey respondents were asked to rate the "overall vitality of your local food scene" on a 1–5 Likert scale where vitality is defined as "the strength and activeness of the local food scene." This question serves as a measure of overall vitality and is used as the dependent variable in a regression as a function of the perceived performance of the 20 individual components of the LFS.

Table 1. Survey Questions on LFS Components.

How Would You Rate the Functioning of the Following Aspects of Your Local Food Scene?		
Food Market Channel Components	**Community Engagement Components**	**Local Food Promotion Components**
Farmers' market quality	Low income neighborhoods have access to fresh food	Label that identifies locally grown or raised items
Retail cooperatives offer food from local farms	Community food festivals	Overall diversity of local food items
Grocery stores offer food from local farms	Food banks are accessible and offer fresh foods	Microbreweries and distilleries promote local food
Restaurants serve local food	On Farm Events	Local government support of the food scene
CSA program quality	Community gardens	Local food is competitively priced
Schools engage with local farms	Cooking, food preservation, and consumer education programs	Private investment in local food business
Food trucks use local ingredients		

Notes: Survey participants were asked these questions twice: once to evaluate Lexington and once to evaluate a previous community.

This survey was first distributed to a "young professionals" group in Lexington through a Facebook invitation. Young professionals were initially targeted because they are distinctly mobile and would provide an assessment of Lexington LFS function through comparisons to communities where they had recently lived. By generating a pool of rankings for each aspect of "all previous communities" (APC), we created a baseline score by which we could compare the scores of Lexington's LFS aspects or any other future surveyed location. Of the 84 individuals who responded to the survey in Lexington, only 34 had lived in a community other than Lexington in the past 10 years. In the future, we will survey more communities—especially elsewhere in the South—to break up and aggregate the APC measures based on different community types (e.g., city size) and consumer segments.

Analysis

Figure 1 provides an overview of the methodology employed to calculate the overall vitality of the LFS as well as the vitality of individual components. We divided the mean of each component by the corresponding APC means to generate component index scores. To measure overall vitality, we similarly divided Lexington's vitality score by the APC vitality score. This provides a simple analysis of the current vitality of the LFS in the community and allows the user to view components that are working well in terms of absolute scores and others that are not faring as well. It also allows between-community comparisons.

Figure 1. Index Analysis – Overall and Component Performance Compared to Previous Community.

Overall Vitality

$$LFVI_{overall} = \left(\frac{Y_L}{Y_{APC}}\right) x\ 100$$

Y_L = LFS vitality mean for Lexington,
Y_{APC} = LFS vitality mean for all previous communities

Individual Component

$$LFVI_i = \left(\frac{X_{i,L}}{X_{i,APC}}\right) x\ 100$$

$X_{i,L}$ = mean performance score for component i in Lexington
$X_{i,APC}$ = mean performance score for component i in all previous communities

To understand how each component's performance is associated with overall measures of LFS vitality, we estimated an OLS regression model with the collected data. In the regressions, Lexington's overall vitality was regressed against its individual LFS component scores (Figure 2), recognizing that a logit model may be more appropriate with a larger sample size. The regression results indicate the specific components that are significant to the overall rating of the LFS. Components that are significantly positive to the overall LFS vitality measure are considered important to or valued by consumers in their LFS. Components that are significant but negatively correlated to overall vitality are harder to interpret. This may indicate that the surveyed residents do not have a clear idea of how well that aspect is functioning. For regressions, "don't know" is coded as 1 and remains part of the regression results because a lack of knowledge about a certain component means that it is less visible or has a smaller niche within the LFS and thus is not as critical to overall perceptions of consumer vitality. These scores provide a starting point for more detailed case studies on the food system.

Figure 2. Regression of Overall Vitality as a Function of Individual Component Vitality.

OLS or Logit Regression
$Y_L = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \cdots + \gamma_{20} X_{20} + \theta_j D_j + \varepsilon_C$
Y_L = LFS vitality mean for Lexington
X_i = mean performance score for component *i* in Lexington
D = demographic variables

Table 2. Component Performance by Community and Comparative Index Measures.

Components	All Previous Communities N=(20-30)*		Lexington N=(50-84)*		Index
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	
Market Channel Performance					
Coop Grocery	2.76	1.14	3.73	0.95	135
Restaurants**	2.72	1.36	3.62	0.86	133
Farmers Market**	3.52	1.34	4.25	0.85	121
Retail	2.55	1.15	3.02	0.95	119
CSAs	3.56	1.36	4.01	0.87	113
Food Truck**	3.27	1.42	3.62	0.92	111
Farm to School	2.65	1.22	2.64	1.21	100
Ethnic Markets	3.12	1.50	2.85	1.09	91
Community Measures Performance					
Food Festivals**	3.14	1.42	3.54	1.02	113
Food Education**	2.87	1.22	3.14	1.00	110
On-farm Events	3.05	1.23	3.16	1.02	104
Low Inc. Comm.	2.26	0.93	2.36	0.94	104
Community Gardens	3.05	1.22	3.00	1.05	98
Food Banks	3.18	1.42	2.79	1.05	88
Local Food Promotion Performance					
Local Food Label***	3.08	1.47	3.72	0.94	121
Breweries Promote LFS	3.59	1.18	4.29	0.71	120
Local Product Diversity*	3.07	1.46	3.53	0.90	115
Govt. Support of LFS	3.19	1.56	3.38	0.93	106
Private Investment in LFS	3.23	1.24	3.37	0.98	104
Price Competitive	3.12	1.14	3.24	0.92	104
Overall Vitality	2.71		3.65		135

Notes: Observations were excluded from means when respondents answered "I don't know." As this response indicates a respondent's lack of knowledge about component performance, more obscure but important component functioning would be pulled down by scoring this as 0. Single, double, and triple asterisks (*, **, ***) indicate statistical significance of that component in a regression of overall vitality at the 10%, 5%, and 1% level.

Results

The general resident consumer performance estimates of Lexington's LFS components are provided in Table 2 below. Each component is listed separately in the left column; overall LFS vitality is at the bottom of the table. For each component, we present the mean scores for both Lexington and survey-takers' previous community. Lexington scores are indexed to the component means for the APCs in the column furthest to the right. Without considering APC means, Lexington scores high in absolute performance for its farmers' market, breweries promoting local food, local food label, and restaurants sourcing locally. It scores low in its food banks, low-income community food access, farm-to-school programs, and ethnic markets.

In comparison to other communities, however, index scores are a bit different. Lexington is comparatively higher in terms of its co-op grocery, restaurant sourcing, farmers' markets, retail, breweries, and the Kentucky Proud local product label. Other components also score comparatively higher, including CSAs, food trucks, food festivals, food education opportunities, and local product diversity. Some of these components—such as food education programs—perform better in Lexington than in other locations but could still be improved upon based on their middling overall score in Lexington (mean: 3.14). Other components—such as the farmers' markets—score quite high overall (mean: 4.25) but are comparatively better than other locations by a smaller margin (index: 121) than something like the co-op grocery (mean: 3.73, index: 135). Higher index scores also indicate that components that are more visible on the LFS landscape. In Lexington, a few components score low compared to other communities, such as the community gardens, food banks, and ethnic markets. These are areas where improvements could potentially be made.

Regression models are used to better understand the relationships between individual LFS components and overall LFS vitality. Table 3 provides estimates of the components with the most significant impact on the overall vitality score based on an OLS model. A few components are positively associated with higher overall vitality, including farmers' markets, restaurants, food education programs, food festivals, local product diversity, and the Kentucky Proud local food label. According to the model, these components are the main drivers of Lexington's local food activity. Only one component—food trucks—was negatively significant. This relationship might suggest that this market channel had little impact on how a person scored the overall vitality of their local food system. In other words, the strength of the food truck scene is not a critical component for Lexington to achieve a strong LFS. Another way to interpret this is that most Lexingtonians have no real understanding of whether or not food trucks are sourcing local products. This may indicate that only a subset of the population knows about what food trucks are doing in the city, especially since the absolute score of this component is 3.62 (see Table 2). This is better than average and scores higher than retail grocery for those who felt they knew enough about the component to rate it.

Table 3. OLS Regression on Lexington Vitality using LFS Performance Measures.

	Coef.	Std. Err.	t	P>t
Market Channel Performance				
Farmers Market**	0.162	0.066	2.45	0.017
Coop Grocery	-0.040	0.044	-0.92	0.362
Retail	-0.062	0.071	-0.87	0.385
Restaurants**	0.170	0.058	2.94	0.005
CSAs	-0.025	0.039	-0.65	0.517
Farm to School	0.031	0.042	0.73	0.468
Food Truck**	-0.072	0.036	-2	0.05
Ethnic Markets	-0.028	0.036	-0.77	0.447
Community Measures Performance				
Low Inc. Comm.	0.040	0.053	0.75	0.454
Food Education**	0.106	0.043	2.43	0.018
Community Gardens	-0.014	0.048	-0.28	0.778
Food Festivals**	0.121	0.052	2.33	0.023
Food Banks	0.004	0.039	0.09	0.927
On-farm Events	0.047	0.043	1.11	0.271
Local Food Promotion Performance				
Local Product Diversity*	0.101	0.057	1.76	0.083
Local Food Label***	0.204	0.066	3.11	0.003
Price Competitive	0.060	0.067	0.91	0.368
Breweries Promote LFS	0.050	0.046	1.09	0.279
Govt. Support of LFS	-0.038	0.048	-0.79	0.432
Private Investment in LFS	-0.006	0.037	-0.15	0.879
_cons	0.765	0.333	2.3	0.025

F	5.88
Prob > F	0.0000
R-squared	0.6511
N	84

Notes: Single, double, and triple asterisks (*, **, ***) indicate statistical significance of that component in a regression of overall vitality at the 10%, 5%, and 1% level.

These results could be used by a local food coordinator to allocate more resources toward strengthening the farmers' market, marketing the Kentucky Proud label, or identifying incentives or marketing programs to increase a restaurant's use of local foods in its menu. These components had high LFS index scores in Lexington and were significant factors of the overall food vitality score. Food festivals and local product diversity are significant to LFS vitality but had lower mean scores compared to other components in the Lexington LFS. A local food coordinator might also direct more investment to these areas to improve performance. Similarly,

lower scoring but important components such as food education programs may represent critical growth areas for improving local food vitality.

Interestingly, the regression results mostly reveal what had already been highlighted in the 2015 Lexington Local Food Demand Assessment. Buyers cited farmers' markets, the Kentucky Proud food label, and the farm-to-restaurant movement as the most important factors in supporting the LFS (festivals and education were not mentioned). That assessment was both time intensive and detailed, but our vitality index highlighted similar findings using significantly fewer resources.

Moving Forward

We will continue to develop this process by focusing on an expanded evaluation of high local food interest groups in Lexington as well as in different-sized communities in the region. These inquiries will create a larger pool of observations by which we might compare how LFS components are valued by distinct geographic and demographic segments. We will also engage in case studies in some surveyed communities to tell a deeper story about why LFS vitality performance measures appear a certain way. These stories will identify the agencies, marketing initiatives, social dynamics, and producer initiatives that contribute to these vitality ratings.

Larger and more diverse samples of the resident consumer populations are needed to more substantially evaluate performance-rating differences across consumers within and across communities. More observations will allow for richer evaluation of the relationships among various LFS components. Finally, this study emphasizes a resident consumer perspective on the performance characteristics of the LFS. An additional perspective on these markets that we intend to explore with a different set of components is producers' characterizations of a high-performing local food market. This index approach will help LFS development stakeholders quickly assess areas of need, high performance, or potential growth.

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