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Developing Viable Farmers Markets in Rural Communities: An Investigation of Vendor Performance using Objective and Subjective Valuations

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Developing viable farmers markets in rural communities: an investigation of vendor performance using objective and subjective valuations

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Abstract

Consumer and public policy interests in local food systems have increased sharply in recent years. Utilizing a unique data set from a six-county region in Northern New York, an empirical model of vendor performance satisfaction is developed as a function of market, vendor, and customer characteristics. Higher levels of performance were associated with vendors selling in a limited number of larger markets, with more amenities, and a variety of production-based vendors; thus, providing supporting evidence for planners in developing regional or multi-community markets. Changes in market policies or incentives for higher value-added and processed food and non-food vendors should also be considered to enhance performance relative to more traditional vendors. The impacts of consumer income and population density factors suggest that markets in more economically challenged or disparate areas may be at an operational disadvantage, and indicative of a need for additional community or public support mechanisms to make these markets viable, particularly in rural areas with a stronger dependence on agricultural production for economic development. However, vendor due-diligence in analyzing and selecting markets based on important market and customer characteristics remains a necessary ingredient for improved performance and long-run viability.

Key Words: farmers market, vendor performance, rural community

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1 Introduction

In the United States, consumer interest in local foods has increased sharply in recent years prompting substantial changes in food supply chains. Increasing utilization of direct marketing channels by producers, such as farmers markets (FMs), provides an essential market mechanism linking farmers and consumers, and delivering benefits to both groups. They allow farmers more control over their distribution and marketing activities as they are closer to the end consumer; and for consumers, they offer an alternative distribution channel where they can seek local, fresh products directly from the source.

FMs have also attracted the attention of policymakers concerned about the ability of consumers to afford nutritious diets. A recent study mandated by the U.S. Congress and coordinated by the U.S. Department of Agriculture (USDA) shows limited potential for affordable, nutritious foods in low-income, rural areas that are sparsely populated because there is little incentive for food retailers to provide a wide assortment of fresh, high-value foods such as fruit and vegetables (Whitacre et al., 2009). The authors discuss the role of expanding food supply chains such as FMs in assuring healthy, affordable diets for consumers and reflect on appropriate policy interventions to facilitate sustained growth.

Farmers Market Nutrition Programs also operate in nearly all states providing federal income subsidies to low income and nutritionally at-risk families to increase consumption of locally grown fresh fruits and vegetables, improve nutrition, and expand FM sales (USDA, 2010). Similar activities are moving forward at the state level. For example, the New York State Healthy Food/Healthy Communities Initiative was created in 2009 in response to rising concern over the lack of access to affordable, nutritious fresh food in underserved communities. The

Initiative includes a food market revolving loan fund to expand consumer access to fresh food markets in rural and urban communities and a matching grants program to support the establishment of FMs across the state (Barker, 2009).

While access to nutritious fresh foods at FMs is an important benefit, there are other benefits often attributed to FMs. The multi-functional nature of these markets is important as it may provide opportunities for local municipalities to address broader community goals and objectives. For example, FMs may improve overall community economic performance by circulating and keeping dollars ‘local’, provide an improved sense of ‘community’ for all residents, or improve the viability of small family farms and preservation of rural landscape amenities (Oberholtzer and Grow, 2003).

1.1 Recent Trends

The level of direct marketing of agricultural products, including FMs, has grown substantially in recent years. As shown in Table 1, the number of U.S. farms selling at least a portion of their sales direct to consumers (D2C) increased by 17.2% from 2002 through 2007, compared to a 3.6% increase in number of all farms (USDA, 2009).¹ The number of FMs in the U.S. has shown particularly strong growth, increasing from around 1,300 in 1994 to nearly 4,700 by 2008 (USDA, 2008).

While farms selling D2C still represent a small proportion of total farms (6.2%) and a smaller portion of total agricultural sales (0.4%), the level of growth in D2C sales from 2002 through 2007 (49.1%) was similar to total agricultural sales growth for the same time period (48.1%) (USDA, 2009). Direct marketing efforts in New York State are even more prevalent,

¹ Direct to consumer sales (D2C) represent the value of agricultural products produced and sold directly to individuals for human consumption from roadside stands, farmers’ markets, pick-your-own sites, etc. It excludes non-edible products such as nursery crops, cut flowers, and wool but includes livestock sales. Sales of agricultural products by vertically integrated operations through their own processing and marketing operations are also excluded. As such, this metric can be viewed as a conservative estimate of total direct marketing sales.

representing larger shares of total farms (14.7%) and total agricultural sales (1.8%), and with average D2C sales per farm nearly 60% higher (\$14,512) than the U.S. average (\$8,853) (USDA, 2009).

[Table 1 here]

1.2 Study Objectives

An abundance of research has investigated consumer preferences for local foods; however, less attention has been placed on the factors that influence vendor and market performance, particularly in rural communities (Brown and Miller, 2008). Evaluating vendor performance is difficult because producers and consumers use a variety of criteria, both objective and subjective, to determine the extent of their local market participation (Brown and Miller, 2008; LeRoux et al., 2010; Thilmany et al., 2008). As such, it is important to consider metrics consistent with these multi-functional attributes.

The objectives of this paper are to identify factors driving FM vendor performance in rural communities and to provide valuable marketing and planning information to vendors, FM managers, community leaders, and policy makers. An empirical model of subjective and objective measures of vendor performance is developed as a function of three broad dimensions: market, vendor, and customer characteristics. Data from 27 FMs operating in Northern New York in the summer of 2008 are used in the empirical analysis. Such a multi-market rural analysis can provide performance recommendations to communities with prioritized community development objectives and stronger connections to local agriculture.

2 The Focal Area

A distinct feature of this study is that the focal geographic area in Northern New York consists of a large region with generally small rural communities and relatively poorer economic

conditions compared to the state as a whole (Figure 1).² Selected socioeconomic trends for the six-county region are summarized in Table 2. Since 2000, the area has experienced a loss in population (-1.1%) compared to positive growth rates for the entire state (2.7%) and the U.S. (8.0%) (Advameg, 2009). The area is also distinguished by low population densities and per capita incomes that are almost 30% below the state average. Such indicators are relevant to the issues of access and affordability of (healthy) foods such as fruits and vegetables, which may be enhanced by increased access to local foods through direct marketing outlets. While the cost of living is also lower, the region shows higher unemployment rates and a less educated labor force (Table 2).

[Figure 1 and Table 2 here]

From 2002 through 2007, the agricultural sector in the region has maintained sales growth consistent with state and national averages (Table 1), but has experienced an above-average drop in farm numbers (USDA, 2009). However, the change in farms with D2C sales (22.3%) is higher than both the averages for NY (14.8%) and the U.S. (17.2%), and represents a larger proportion of farms compared to other states (USDA, 2009). While average total sales per farm are higher in this region of the state, sales of D2C products are much lower. This may indicate an opportunity for growth in these rural communities, but may also be a reflection of the limitations afforded to direct sales opportunities given lower population densities and consumer incomes.

The multi-functional nature of FMs in the region can be illustrated by customer responses describing their experiences - of customers surveyed in the summer of 2008 ($N=1,628$ responses, 27 markets), 30.0% attended FMs to get the freshest products possible, followed by 26.6% who

² For our purposes, Northern New York is defined as the six-county region of Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex counties.

felt their patronage helped to keep small farms viable (Figure 2). These motivations were followed more distantly by reduced environmental impacts relative to traditional trucking and distribution (16.9%), an improved a sense of “community” (15.1%), and support for agriculture as an important rural landscape amenity (11.4%).

[Figure 2 here]

3 Measuring Performance

The existing literature demonstrates potential for increases in farm returns through direct marketing; however, the evidence is mixed and depends on a host of spatial, market, and demographic factors, as well as firm preferences that may not be financially based (Hardesty, 2007; Hunt, 2007; LeRoux et al., 2010; Monson et al., 2008). Common generalizations associated with FM vendor performance are problematic given the highly heterogenous nature of participating vendors and community demographic conditions.

Hughes et al. (2008) show that FMs tend to increase retention of dollars in the locality but not as high as believed when opportunity costs are accounted for. Studies focusing on performance find that FM vendors tend to be more successful in higher income locales and located in urban areas with larger vendors that develop stronger collaborative strategies with other vendors (Feenstra et al., 2003; Griffin and Frongillo, 2003; Varner and Otto, 2008;).

Other studies focus on vendors’ self-assessment of performance and find that vendor satisfaction with their margins depends on demographic characteristics of the farmer, types of products offered, and the growing stage of the vendor’s enterprise (Govindasamy et al., 2003). Stephenson et al. (2008) point out that although the number of FMs is increasing, many of them are failing. They identify factors associated with failure, including low managerial skills of FM administrators, small size of vendors, limited product assortment, and high managerial turnover.

This study makes several contributions to this emerging literature focusing on vendor and market performance. First, FMs in rural communities with declining populations and symptoms of economic stagnation are primarily considered. Most previous studies have focused on either a limited number markets or those operating in more populated urban areas; Varner and Otto (2008) and Biermacher et al. (2007) are notable exceptions. The viability of FMs in sparsely populated rural areas in the U.S. is an emerging food policy issue, in particular with recent evidence indicating the existence of food deserts in rural areas (Whitacre et al., 2009). Second, using a unique data set, determinants of vendor performance are considered simultaneously from several dimensions (i.e., customer, market, and vendor characteristics); previous partial assessments may have omitted relevant variables that could bias the results.

Finally, since vendors may consider both financial and non-financial factors in assessing their performance, both objective and subjective measures are considered. This distinction is important. For example, it is not uncommon for vendors to utilize FMs as a way to advertise their farm/products and alternative channels available to consumers (e.g., u-pick operations, Community Supported Agriculture (CSA)). Other vendors may simply appreciate the opportunity to interact with customers and/or promote particular forms of production (e.g., organic, free-range, humane). In either case, vendors may well be satisfied if they simply cover their costs or reach some minimal level of sales. An analysis based only on financial performance may miss factors that vendors value and result in misleading implications and recommendations.

Next, we present a description of the conceptual framework, empirical approach, and data collected. Finally, we discuss our results and close with some implications and summary conclusions.

4 Conceptual Framework

The conceptual framework for our analysis is presented in Figure 2. Building on previous literature, we argue that FM vendor performance depends simultaneously on a host of factors comprising market, customer, and vendor characteristics. Vendor performance is measured in two dimensions, both objective and subjective. Objective measures are related to the financial performance of the vendor, while subjective measures also encompass other, non-financial objectives of FM vendors.

[Figure 3 here]

Farmers market characteristics take into account the different institutional arrangements established to facilitate transactions between vendors and customers. Market characteristics considered most relevant include market size, market age, the assortment of amenities and services provided to customers and/or vendors, rules for vendor participation in the market, the type of contractual arrangement between the market and its manager, and the composition of vendors attending the market.

Customer characteristics account for demand-related aspects of FMs. Specifically, we employ measures of customer expenditures and proximity between market and household locations. These primary data measures were gathered from actual market customers, rather than using secondary demographic data available from public sources.

Finally, vendor characteristics capture supply-related factors affecting FM participation. In particular, we include characteristics such as vendor experience in direct marketing activities, importance of FMs in the vendor's distribution strategy, product assortment of the firm, and quality of the vendor-FM manager relationship.

FM vendor performance can be measured objectively using a metric related to vendor sales. However, employing such a measure solely may be misleading, because participation in FMs may be only a small part of the overall marketing and distribution strategy. For instance, FM participation may be an effective promotional strategy to create awareness among consumers and influence their preferences. Moreover, there may be other hard-to-measure objectives such as FM vendor contribution to quasi-public, nonfinancial aspects of FMs including promoting rural landscape amenities, supporting lifestyle preferences, or enjoying customer interaction and face-time. To address this, a subjective measure based on the vendor's self assessment of performance was also used.

5 Data Collection

Data were collected in the summer of 2008 from 27 FMs operating in Northern New York (Figure 1). Comprehensive surveys were developed and administered to market managers, customers, and vendors and at each of the participating markets.³ Market managers completed a 31-question written survey providing information on market and management characteristics, market expenditures, promotion activities, customer traffic, estimated sales, vendor composition, and expectations for future growth. Of the 27 markets included in the study, 21 surveys were returned, with 19 containing complete data for analysis (70.3%).

To collect customer information, Rapid Market Assessments (RMA) were conducted in each of the participating markets. Gathering customer data can be challenging and written questionnaires or interviews can suffer from small sample size and selection bias issues (Lev et al., 2004). Alternatively, RMAs ask a limited number of multiple-choice questions displayed on easels, where customers are recruited to participate as they enter the market and give their

³ Full copies of the vendor, market manager, and customer surveys are available upon request from the corresponding author.

responses by marking appropriate locations on question sheets. One RMA was conducted at each market on a ‘typical’ market day (i.e., not during special festivals or events), with questions addressing attendance motivations, purchase amounts per visit, ratings on various market characteristics, travel distances, and influences of market promotion activities. On average, approximately 50 customers participated per market.

Approximately 200 vendors were asked to complete a 32-question written survey providing information on firm characteristics, the number and location of FMs attended, relationships with management, products sold, other market channels utilized, average customer numbers and sales levels, and the level of satisfaction with their FM profitability. Of 124 vendor surveys returned, 68 vendor surveys could be both matched with returned market survey data (19 of 27 markets) and had sufficient vendor data for analysis (34%). Given that some vendors attended more than one market in the focal area, the final data set included 103 unique vendor-market observations.

6 Empirical Model

Alternative models evaluating objective and subjective FM vendor performance were estimated. To account for the potential correlation in residuals between the objective and subjective models, a joint continuous-discrete simultaneous equations model was initially estimated. In general, the model can be expressed as:

$$(1) \quad SC_{ij} = \delta_1 + MARKET_j \beta_1 + CUSTOMER_j \hat{\delta}_1 + VENDOR_i \alpha_1 + \varepsilon_{ij,1}$$

$$(2) \quad PS_{ijk} = \delta_{2,k} + MARKET_j \beta_2 + CUSTOMER_j \hat{\delta}_2 + VENDOR_i \alpha_2 + \varepsilon_{ij,2,k}$$

where SC_{ij} is the sales per customer for vendor i at market j , PS_{ijk} is the k^{th} level of profit satisfaction for vendor i at market j ($k = 1, \dots, K$), $MARKET_j$ is a vector of market characteristics for market j , $CUSTOMER_j$ is a vector of customer characteristics for market j , $VENDOR_i$ is a

vector of vendor characteristics for vendor i , β , δ , and α are vectors of parameters to be estimated, and $[\varepsilon_{ij,1}, \varepsilon_{ij,2,k}]$ is a matrix of residual errors with a multivariate normal joint distribution, mean 0 and covariance matrix $\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \Psi_2 \end{bmatrix}$, where σ_1^2 is a $K \times K$ diagonal matrix with $\text{var}(\varepsilon_{ij,1}) \forall k$, σ_{12} is a $K \times K$ diagonal matrix with $\text{cov}(\varepsilon_{ij,1}, \varepsilon_{ij,2}) \forall k$, and $\Psi_2 = [\varphi_{k,l}]_{k,l=1,\dots,K}$ is $K \times K$ covariance matrix with $\varphi_{k,l} = \text{cov}(\varepsilon_{ij,2,k}, \varepsilon_{ij,2,l}) \forall k, l$.

The model is estimated using maximum likelihood, where the probability of the multivariate normal distribution is computed using the GHK recursive simulation method (Hajivassiliou, 1993).⁴ Single-equation models were also estimated (implying $\sigma_{12} = 0$) using a multinomial logit specification for PS_{ij} and ordinary least squares (OLS) for SC_{ij} .

6.1 Model Variables

The operationalization of variables corresponding to the conceptual framework in Figure 1 and empirical equations 1 and 2 is presented in Table 3, along with descriptive statistics.

[Table 3 here]

6.1.1 Farmers market characteristics

FM characteristics included number of vendors (VEN_NO), years of operation (MKT_AGE), and whether the manager is employed at least part time at the market (MGR_TIME). To assess the impact of market rules and services provided, the market's minimum percentage requirement for selling own-vendor products ($PRDRQT$) and the number of market amenities available (AM_COUNT) were included. Finally, to assess the impact of vendor composition, the percentage of vendors selling certified organic ($VEND_CO$) and non-certified organic products ($VEND_NCO$) were also included.

⁴ The joint model was estimated with the PROC QLM procedure in SAS, v. 9.2.

The sample represented a broad size range, with the number of vendors per market (*VEN_NO*) ranging from 5 to 52, and a 17.6-vendor average (Table 3). Markets were relatively mature, with the average years in operation of 8.9 (*MKT_AGE*), including more than one-half that were over ten years old.⁵ However, reflecting more recent emergence of FMs in the region, 20 percent have been operating for less than two years. Thirty seven percent of markets had at least half-time managers (*MGR_TIME*) and an average minimum percentage requirement for selling own products (*PRDRQT*) of 68%.

The policy regarding selling a minimum percentage of own-products is a source of contention and conflict at many markets. While the average minimum requirement across all markets was 68%, some markets had no requirements and some allowed no sales of other firms' products at all. Vendors argue that consumers expect a full array of products, even early in the growing season when local products are not yet available; being able to bring these products from other sources would satisfy consumer demands and improve vendor sales. Alternatively, management often argues that minimum policies are necessary to reflect consumer demand for strictly 'local' products and their desire to make a closer connection between the food they eat and those that produce it.

Managers indicated which of 13 categories of various amenities were available at their markets (*AM_COUNT*). Amenities included such things as restrooms, electrical hookups, convenient and ample parking, refrigeration, concessions, buildings, and picnic areas. On average, markets had 7.2 amenities, with convenient parking the most common (92%) and bathrooms the least (8%) (Table 3). Vendor distribution by production method varied considerably across markets but, on average, 7.8% of the vendors were certified organic

⁵ A continuous market age variable was constructed by using mid-point values for the market age categories included in the survey; i.e., less than 2 years, 2 to 5 years, 6 to 10 years, and over 10 years. The extreme values were assumed to be 1 year and 12 years, respectively.

(*VEND_CO*), 18.2% were non-certified organic (*VEND_NCO*), and the balance were non-organic, conventional vendors.

6.1.2 Customer characteristics

Customer factors associated with each FM included the percent of customers with average purchase amount per visit less than \$25 (*APA_LT25*) and the percent of customers traveling less than five miles to the market (*TRVL_LT5*). These to serve as reasonable proxy measures for customer disposable income and market-area population density, respectively.

Based on vendor and market sales data, FMs in this region generated around \$1 million in total customer sales per season. While considerable, reported customer spending was relatively modest, with over 85% spending less than \$25 per visit (*APA_LT25*) (Table 3). As expected, consumers more proximally located to markets were the primary attendees, with 61% traveling fewer than 5 miles.

6.1.3 Vendor characteristics

Vendor characteristics included years of selling experience (*FMSELL*), number of FMs regularly attended (*MKTS*), whether the vendor was a full-time farmer (*STA_FULLL*), share of total firm sales from FMs (*INC_FM*), a vector of dummy variables representing the types of products sold, including fruits and vegetables (*SELL_FV*), meat and dairy (*SELL_MD*), processed foods or beverages (*SELL_PFB*), arts, crafts, and jewelry (*SELL_ACJ*) and plants and nursery (*SELL_PN*), and satisfaction with market management performance (*MGR_SAT*).

Vendor composition at these markets was heterogeneous in several dimensions. The average years of selling experience (*FMSELL*) was almost 6 years, but ranged from first-year vendors to those with 30 years of experience (Table 3). The average number of markets attended

(*MKTS*) was 2.8, but ranged from 1 to 18 (the median was 2), and nearly one-third of the vendors classified themselves as full time farmers (*STA_FULL*) (Table 3).

On average, 41.0% of total firm sales came from FMs (*INC_FM*); the percentage varied from very small (5%) to exclusively (100%). While not shown in Table 3, nearly one-third of vendors sold through wholesale channels (e.g., packer/distributor, grocery store, restaurant), and over one-half participated in other direct marketing channels (e.g., CSA, farm stand, u-pick operation). On average, vendors participated in 1.2 other market channels (wholesale or direct), and ranged from zero to five.

Producers selling fruits and vegetables (*SELL_FV*) made up the largest proportion of vendors (50%); however, there were significant numbers of vendors in all categories, including 23% meat and dairy (*SELL_MD*), 35% processed foods and beverages (*SELL_PFB*), 27% arts, crafts, and jewelry (*SELL_ACJ*), and 32% plants and nursery (*SELL_PN*) (Table 3). Noting that that the sum of these percentages is well above 100%, it was not uncommon for individual vendors to sell products from multiple categories. On average, vendors sold products in 1.6 categories, with a range from 1 to 4.

Finally, to assess the impact of vendor-management relations on satisfaction and performance, vendors were asked how satisfied they were with management performance (*MGR_SAT*). Approximately 52% of vendors were very satisfied, with the remaining either ‘satisfied’ or ‘not satisfied’ (Table 3).

6.1.4 Measures of vendor performance

To develop objective measures of vendor performance, vendors categorized the average number of customers who stopped by their booth and average total sales per market day. Objective measures of performance (*SALES* and *CUST* for sales and customers, respectively)

were created using mid-point levels for each category.⁶ Average gross sales and average numbers of customers per market day were and \$204.3 and 63.2, respectively (Table 3). Average sales per customer (*SALES_CUST*) were computed by dividing *SALES* by *CUST*, and translated into average sales per customer stop of \$3.93.

To encompass non-financial factors related to performance, vendors categorized how satisfied they were with their level of FM profitability. Approximately 34% of vendors were very satisfied, 59% were satisfied, and 7% were not satisfied (Table 3). Interestingly, a similar breakdown resulted for a sample of producers participating in New Jersey FMs in 1997: 31% were very satisfied with their FM profit margin, 60% were either satisfied or somewhat satisfied, and 6% were not satisfied (Govindasamy et al., 2003).

7 Empirical Results

Estimated coefficients between the single-equation and joint models (i.e., equations 1 and 2) were similar; however, the joint model generally showed lower levels of statistical significance. Further, one could not reject the null hypothesis for the joint model that the estimated correlation between the equations' residuals was zero (i.e., $H_0: \sigma_{12} = 0$, p -value = 0.209). As such, the presentation and discussion of results focus on the statistically-preferred single-equation estimates (Table 4).⁷ To account for potential nonlinear effects and to improve the estimation results, quadratic terms for continuous variables were included, where appropriate, in the sales performance model.

Since the estimated logit coefficients are not easily interpretable (Table 4, column 2), a more detailed discussion of the individual impacts follows using the estimated logs odds ratios

⁶ Customer categories included less than 25, 25-50, 51-100, 101-150, and more than 150. Sales categories included less than \$25, \$25-50, \$51-100, \$100-200, \$200-300, \$300-400, \$400-500, and more than \$500. The extreme values were assumed to be 12.5 and 200 for customers and \$12.50 and \$550.00 for sales.

⁷ The full set of regression results for both the single- and jointly-estimated models is available from the corresponding author upon request.

(Table 4, column 4). Odds ratios are interpreted as the odds of being in a higher satisfaction category when the variable under consideration is increased by one unit, holding all else constant. An odds ratio greater than one implies that the odds of being in a higher category increase with a higher value of the variable, while an odds ratio between zero and one implies that the odds of being in a higher category decrease when that variable increases. For comparison, elasticities for the continuous variables and marginal effects for the binary variables were computed from the sales model estimates (Table 4, column 3) and are shown in Table 4, column 5. Elasticities measure the percentage change in sales per customer for a 1% change in that variable, holding all else constant, while marginal effects estimate the difference in sales per customer when the particular binary variable is true (equal to 1) versus not true (equal to zero), all else held constant.

7.1 Vendor Factors

While selling experience (*FMSELL*) was positively associated with sales per customer, it did not statistically impact vendors' profit satisfaction. The sales elasticity was 0.23 implying that a 1% increase in years selling improves vendor sales per customer by 0.23% (Table 4). While the response is inelastic, relatively large percentage changes can occur, particularly for newer vendors; e.g., an additional year of FM sales experience for a vendor with two years of experience (i.e., a 50% increase) would be expected to increase sales over 10%. The results are appealing in that experience positively contributes to sales, but is not surprising regarding satisfaction given the strong growth in the channel from relatively new participants. The mixed results are similar to Govindasamy et al. (2003) who, while not using FM sales experience directly, found that older vendors at FMs were less satisfied with their profit margin, but those vendors whose business was in a 'growing stage' (and perhaps younger) were more satisfied.

Both measures of performance were affected by the number of markets vendors attended (*MKTS*). Specifically, for each additional market, the odds of improving vendor satisfaction drop by 19% (1-0.81) (Table 4). Given that the total amount of product available to be sold at FMs in any given week can be assumed to be fixed, vendors would appear to prefer selling at a limited number of larger markets. The estimated sales elasticity was not significantly different from zero at the sample mean (i.e., $\overline{MKTS} = 2.8$, Table 3), but does improve when evaluated at the data extremes. Given the quadratic relationship and estimated coefficients, the number of markets that would maximize sales (all else held constant) is relatively high at 7.1 ($-0.579/2*(-0.041)$, p -value < 0.001). The results appear intuitive – reallocating products among a few markets can increase sales, but beyond some point, limitations on total product available and time constraints would inhibit future gains.

Full time farmers (*STA_FULL*) in this region were more satisfied with their performance and had higher sales per customer. Specifically, relative to part-time/hobby farmers, full-time farmers sold, on average, an additional \$1.17 per customer, and the odds of full-time farmers being satisfied with their performance were nearly five times as large as the odds for part-time/hobby farmers (Table 4). The sales estimate may be the result of full-time farmers having larger product supplies or more varieties of products to sell. The satisfaction estimate appears to support the increased sales response, but also can include other non-direct financial benefits larger farmers may receive; e.g., advertising benefits for other market channels.

Vendors selling arts and crafts products (*SELL_ACJ*), processed food or beverage products (*SELL_FOTH*), or meat and dairy products (*SELL_MD*) were much less satisfied with their level of profitability relative to those who didn't sell these products. Specifically, the odds of these types of vendors being in a higher satisfaction category are only 0.24, 0.35, and 0.16

times that, respectively, of vendors that don't sell these products (Table 4). Processed food and beverage vendors' lower satisfaction was reinforced by lower sales per customer (\$-1.67). Sales per customer were actually higher for meat and dairy product vendors (\$+1.34), but presumably by not enough relative to their generally higher priced products for sale. While fruit and vegetable (*SELL_FV*) and plants and nursery (*SELL_NFOTH*) vendors were indifferent regarding their satisfaction relative to other types of vendors, per customer sales were lower (\$-3.02 and \$-2.28, respectively), reflecting lower-priced raw or unprocessed products typically sold.

The percent of total sales received from FMs (*INC_FM*) can be interpreted as a proxy measure for a vendor's level of market channel diversification. Vendors that concentrated more sales at FMs were associated with higher levels of vendor performance satisfaction; i.e., for every one unit increase in the percent of sales at FMs, the odds of being in a higher satisfaction category increases 1.03 times (Table 4). While the odds ratio appears modest, a large shift in channel strategy to FMs could have substantial impacts on vendor satisfaction. For example, if a vendor increased sales from 50% at FMs to 100% (all else held constant), the odds of being in a higher satisfaction category increase by over 50 times! This result is in contrast to Govindasamy et al. (2003) who found no statistical association between the proportional share of FM sales with vendor profit satisfaction; however they did find that vendors with 70% or more of their sales through retail channels (including FMs) were much more satisfied with their profit margins.

The impact on sales per customer for this variable (*INC_FM*) was also interesting. The estimated sales elasticity is not significant at the sample mean ($\overline{INC_FM} = 41\%$, Table 3); however, the estimated elasticities are significant and negative (positive) for relatively low (high) percentage levels. The negative sign on the level term (*INC_FM*) and positive sign on the

quadratic term (INC_FM^2) implies a *u*-shaped response where sales per customer are *minimized* at 50.5% (p -value < 0.001). This result is interesting in that to maximize sales per customer *at FMs*, the model suggests that vendors should sell either a very small proportion of their products (technically approaching zero in the limit) or all of their products through this channel; i.e., a non-diversified strategy. This result may be indicative of the highly heterogeneous nature of vendors in the sample, where it is common for smaller firms to sell exclusively through the FM channel, while larger vendors may use this venue to highlight niche products produced or test new products for sale. It is also important to point out that the dependent variable represents FM sales only, and not total firm sales. Evaluated at sample extremes, a 5% strategy would return \$4.79 in sales per customer, a 50% strategy \$3.23, and a 100% strategy \$5.08.

To gauge the impact of vendor-manager relations, vendors were asked how satisfied they were with the managers' performance at the markets they attended (MGR_SAT). The odds ratio on vendor satisfaction was well above one (2.32, Table 4), indicating the importance of monitoring and evaluating vendor relations with management, but the estimate was only weakly significant (p -value = 0.13). Further, there was no direct impact on vendor sales performance.

7.2 Market Factors

Nearly all market variables had statistically significant impacts on vendor satisfaction, but only the market time commitments of managers (MGR_TIME) affected sales per customer. Even so, the marginal impact of this factor was quite large, increasing average sales per customer by \$2.33 (Table 4). This may be due to the fact that managers more fully employed are likely have additional specialized training or managerial skills that can improve overall market operations and efficiencies. However, with no impact on overall satisfaction, vendors may

equally appreciate part-time or volunteer managers, many of whom are often market vendors themselves.

Interestingly, a higher number of vendors (*VEN_NO*) was associated with higher levels of vendor satisfaction (odds ratio = 1.11, Table 4), implying that vendors prefer to participate in larger markets. In contrast to Varner and Otto (2008) who found a positive effect of vendor number on total market sales per capita (estimated from customer surveys), the impact on sales per customer for this sample of rural markets (estimated from individual vendor surveys) was not statistically different from zero. While the odds ratio is relatively small, relatively large changes in market size can cumulatively impact vendor satisfaction significantly. Intuitively, the results make sense; that is, given no difference in sales performance (i.e., a limited competition effect), vendors are more satisfied at markets with a higher number of vendors, likely related to other non-financial factors such as increased advertising effectiveness for other channels utilized by vendors (i.e., if higher vendor numbers is also associated with higher customer traffic).

Consistent with Varner and Otto (2008), this sample of vendors and markets reveals no significant market age effect (*MKT_AGE*) on vendor sales per customer. However, vendors at older markets were less satisfied than vendors at markets more recently established. Specifically, for a one year increase in the age of the market, the odds of improving vendor satisfaction drops 21% (1-0.79, Table 4). The increased demand for and popularity of FMs more recently may be having a ‘halo’ or ‘glow’ effect on new markets with vendors actively promoting themselves and their operations to secure new customers.

The number of market amenities is also important to vendor satisfaction. While having no effect on sales, each additional (average) amenity improves the odds of vendors being more satisfied by 2.0 times (Table 4). While a larger number of amenities could increase customer

traffic and total sales, sales per customer would not necessarily be affected. In addition, specific types of amenities can have very different effects; e.g., a picnic area versus a building or restrooms, and using a simple count of amenities likely disguises this affect.

Both the percentage of total vendors that provide certified organic (*VEND_CO*) and non-certified organic (*VEND_NCO*) products contributed positively to vendor satisfaction. For each percent increase in these organic vendors, the odds of vendors at these markets having higher satisfaction improved by 1.09 and 1.05 times, respectively (Table 4). These results are consistent with other studies who found positive contributions from organic products on vendor satisfaction (Govindasamy et al., 2003) and direct market sales (Wier et al., 2008). Conventional vendors at markets with higher percentages of organic vendors may highlight a wider product assortment for customers for which they have a distinctly different (and likely lower-priced) product. Alternatively, organic producers may feel more satisfied at markets with other vendors that follow and believe in similar production practices.

The final market factor evaluated was the minimum percentage of own-produce (or products) that must be sold by the vendor (*PRDRQT*). As often argued by vendors, higher percentage requirements may limit sales, particularly early in the market season. The negative sales effect is consistent with that argument (elasticity = -0.45, Table 4); however, the effect is only weakly significant (p -value = 0.14). A similar negative result is indicated for vendor satisfaction but, again, the result is not significantly different from zero. While the vendor argument may be valid in certain areas with longer (or year-round) market seasons, FMs in Northern New York have relatively short seasons (generally 10 to 16 weeks), so such a requirement may not make as much of a difference.

7.3 Customer Factors

Vendors were found to be more satisfied at markets with higher customer spending levels (lower *APA_LT25*) and at markets located in areas with shorter average travel distances (*TRVL_LT5*). However, neither of these factors was associated with changes in sales per customer. While most studies on direct marketing-participation find positive consumer income effects on vendor performance (Feenstra et al., 2003; Gandee, et al., 2003; Griffin and Frongillo, 2003; Morgan and Alipoe, 2001; Schatzer, et al., 1989; Varner and Otto, 2008), some find the opposite (Govindasamy and Nayga, 1997). Measuring population or density effects are less common in the literature, with mixed results showing both positive (Henneberry and Agustini, 2004) and negative (Morgan and Alipoe, 2001) effect. However, all of these past studies used only sales measures as their performance metric, and most used only secondary population and income data.

Specifically, we find for each 1% increase in the percent of customers spending less than \$25 per visit, the odds of vendors being in a higher satisfaction category decreased by 4% (1-0.96), and for each 1% increase in the percent of customers traveling less than 5 miles to the market, the odds of vendors being in a higher satisfaction category increase 1.03 times (Table 4). Again, while these estimates appear modest at the margin, significant variation in these characteristics existed across markets in the sample (e.g., *APA_LT25* ranged from 50% to 100% and *TRVL_LT5* ranged from 31% to 89% across markets) and, thus, could cumulatively have relatively large impacts. Travel distance effects may also be related to the importance of making stronger farmer-consumer connections.

8 Conclusions and Implications

FMs continue to draw increasing attention by consumers and policy makers as a local source of and affordable access to fresh and nutritious foods in rural communities. Results from a

comprehensive model simultaneously accounting for various market, vendor and customer factors on vendor performance revealed that FM success should be defined by more than just the direct financial sales performance of vendors. Indeed, market customers, vendors, and community planners are all likely to have multiple objectives for developing and participating in this unique market channel.

Vendor-specific characteristics were shown to be important in determining both the level of vendor satisfaction and sales performance. In contrast, market and customer characteristics were generally found not to be associated with vendor sales performance, but were important in affecting overall vendor satisfaction. As such, to the degree that market success can be adequately defined by the satisfaction of its vendors, it is vital to consider such a metric when evaluating success and identifying strategies to improve market performance. However, when an understanding of the specific effects on financial sales performance is desired, comprehensively evaluating both objective and subjective performance measures puts both sets of results in proper perspective.

Higher levels of satisfaction were estimated for vendors selling in a limited number of larger markets, with more amenities, and a variety of production-based vendors, providing preliminary evidence for community leaders and market planners to consider developing regional or multi-community markets, while balancing the disadvantages associated with longer travel distances for outlying consumers. Higher vendor satisfaction at relatively newer markets in the region emphasizes the importance for more established markets to continually develop new and innovative market features or activities and to upgrade facilities to maintain and improve market attendance and increase vendor satisfaction.

Increased attention is also warranted to the performance of vendors providing higher value-added and processed food and non-food products. Even though sales per customer were lower, rural markets in the region appear to be primarily benefiting from more traditional fresh fruit and vegetable and plants/nursery product vendors, while vendors of processed foods, meats and dairy, and non-food products struggle to achieve the types of performance they seek. Additional infrastructure (e.g., refrigeration, electricity) or changes in market policies or incentives for these vendors (e.g., reduced vendor charges) may be necessary to increase the long-run availability of a wider selection of food and non-food products for consumers.

Full-time farmers participating in the region's FMs had higher sales performance and higher satisfaction. In an area arguably more reliant on the agricultural industry for economic growth, successful full-time farmers may have a larger impact on overall industry performance, relative to operations where farm-based income is a smaller proportion of total earnings. Identifying new local product marketing opportunities for producers currently not participating in such markets would seem a worthwhile educational outreach opportunity for the region.

Finally, given the impacts on vendor satisfaction based on consumer income and travel distance, it appears that markets in more economically challenged (lower disposable incomes) or disparate areas (lower population densities) may well be at an operational disadvantage. Such results may be indicative of a need for additional community or public support mechanisms to make these markets viable, particularly in more rural areas with a stronger dependence on agricultural production for economic development. However, vendor due-diligence in analyzing and selecting markets based on important market and customer characteristics remains a necessary ingredient for improved performance and long-run viability.

Continued research across a variety of rural communities and regions will be important to the further development of sound public policies and market strategies aimed at improving market performance. Extending the model further would also be useful in developing benefit-cost ratio estimates or ‘expert systems’ for policy makers to more easily justify public sector support or attract more private sector investment. More holistically modeling the development of market channel strategies by producers; that is, how firms choose what distribution channels to enter, including FMs as well as other direct and wholesale channels, will provide additional information for producers in evaluating their firm’s overall economic performance and making sound business decisions for the future. A careful examination of these issues is a top priority for our continuing research.

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Table 1

Farm and Direct-to-consumer (D2C) sales in U.S., New York, and study focal area, 2002-2007. *Source:* USDA, 2009.

Variable	Unit	Geographic Area		
		U.S.	NYS	Focal Area ^a
Change in number of all farms	%	3.6	-2.4	-6.6
Average total sales per farm, 2007	\$	133,807.0	232,662.0	139,592.0
Change in total farm sales, 2002-2007	%	48.1	41.7	46.6
Change in number of farms selling D2C	%	17.2	14.8	22.3
Farms selling D2C, 2007	%	6.2	14.7	14.5
Average D2C sales per farm, 2007	\$	8,853.0	14,512.0	6,727.0
Change in D2C sales, 2002-2007	%	49.1	29.7	23.3
D2C sales of total farm sales, 2007	%	0.4	1.8	0.7

^a County-level averages used for focal area.

Table 2Demographic profile of focal Area, New York, and U.S., 2007. *Source:* Advameg 2009.

Variable	Unit	Geographic Area		
		U.S.	NYS	Focal Area ^a
Population change, 2000-2007	%	8	2.7	-1.1
Population density (people/square mile)	<i>no.</i>	79.6	401.9	46.9
Per capita Income	\$	26,178.0	29,885.0	21,172.0
Median housing value	\$	181,800.0	311,000.0	108,714.0
Cost of living index	<i>no.</i>	100.0	148.0	84.4
Percent below poverty line	%	13.3	14.6	15.3
Unemployment rate	%	9.6	8.0	11.8
Education at least bachelors degree	%	27.0	31.2	21.3

^a City, Township, or County-level averages used for focal area where available.

Table 3Descriptive statistics of market, customer, and vendor characteristics and vendor performance.^a

Variable	Definition	Mean	Std Dev	Min.	Max.
Farmers Market Characteristics:					
<i>VEN_NO</i>	Average number of vendors	17.65	9.93	5.00	52.00
<i>MKT_AGE</i> ^b	Age of market (years)	8.88	4.13	1.00	12.00
<i>MGR_TIME</i>	Manager at least half-time = 1, else 0	0.37	0.48	0.00	1.00
<i>PRDRQT</i>	Minimum requirement own-product sale (%)	67.67	23.27	0.00	100.00
<i>AM_COUNT</i>	Number of market amenities	7.16	2.06	4.00	11.00
<i>VEND_CO</i>	Vendors selling certified organic (%)	7.78	13.31	0.00	38.00
<i>VEND_NCO</i>	Vendors selling non-certified organic (%)	18.22	21.86	0.00	88.00
Customer Characteristics:					
<i>APA_LT25</i>	Average purchase amount less than \$25 (%)	85.48	14.13	50.00	100.00
<i>TRVL_LT5</i>	Travel distance less than 5 miles (%)	61.00	16.49	31.03	89.29
Vendor Characteristics:					
<i>FMSELL</i>	Years selling at farmers markets	5.78	6.21	0.05	30.00
<i>MKTS</i>	Number of markets regularly attend	2.76	2.98	1.00	18.00
<i>INC_FM</i>	Sales from farmers markets (%)	41.03	32.10	5.00	100.00
<i>STA_FULL</i>	Full time farmer or business = 1, else 0	0.32	0.47	0.00	1.00
<i>SELL_FV</i>	Sell fresh fruits or vegetables = 1, else 0	0.50	0.50	0.00	1.00
<i>SELL_MD</i>	Sell meat or dairy products = 1, else 0	0.23	0.42	0.00	1.00
<i>SELL_PFB</i>	Sell processed foods or beverages = 1, else 0	0.35	0.48	0.00	1.00
<i>SELL_ACJ</i>	Sell arts, crafts, or jewelry = 1, else 0	0.27	0.45	0.00	1.00
<i>SELL_PN</i>	Sell plants or nursery products = 1, else 0	0.32	0.47	0.00	1.00
<i>MGR_SAT</i>	Satisfied with management = 1, else 0	0.52	0.50	0.00	1.00
Vendor Performance Measures:					
Objective: ^c					
<i>SALES</i>	Average sales per day (\$, <i>N</i> =93)	204.30	129.63	12.50	550.00
<i>CUST</i>	Average number of customers per day (<i>N</i> =93)	63.17	39.45	12.50	200.00
<i>SALES_CUST</i>	Average sales per customer stop (\$, <i>N</i> =93)	3.93	2.82	0.33	12.00
Subjective:					
<i>SAT_VS</i>	Very satisfied with profitability = 1, else 0	0.34	0.48	0.00	1.00
<i>SAT_S</i>	Satisfied with profitability = 1, else 0	0.59	0.49	0.00	1.00
<i>SAT_NS</i>	Not satisfied with profitability = 1, else 0	0.07	0.25	0.00	1.00

^a Unless otherwise noted, *N* = 103.^b A continuous market age variable was constructed by using mid-point values for the corresponding categories included in the survey; i.e., less than 2 years, 2 to 5 years, 6 to 10 years, and over 10 years. The extreme values were assumed to be 1 year and 12 years, respectively.^c Continuous sales and customer variables were constructed by using mid-point values for the corresponding categories included in the survey; i.e., less than 25, 25-50, 51-100, 101-150, and more than 150 for customers, and less than \$25, \$25-50, \$51-100, \$100-200, \$200-300, \$300-400, \$400-500, and more than \$500 for sales. The extreme values were assumed to be 12.5 and 200 for customers and \$12.50 and \$550.00 for sales.

Table 4

Regression results from subjective and objective vendor performance models, and estimated logs odds ratios (subjective) and elasticities and marginal effects (objective)^a.

Variable	Vendor Performance Model Parameter Estimates		Logs Odds Ratios	Elasticities or Marginal Effects ^b
	Vendor Satisfaction	Sales per Customer	Vendor Satisfaction	Sales per Customer
Vendor Characteristics				
<i>FMSELL</i>	0.003 (0.051)	0.158 ** (0.071)	1.003	0.229 **
<i>MKTS</i>	-0.206 ** (0.101)	0.579 (0.389)	0.814 **	0.246
<i>MKTS</i> ²		-0.041 ** (0.020)		
<i>STA_FULL</i>	1.599 ** (0.625)	1.169 * (0.664)	4.950 **	1.169 *
<i>SELL_FV</i>	-0.459 (0.616)	-3.021 ** (0.699)	0.632	-3.021 **
<i>SELL_MD</i>	-1.855 ** (0.691)	1.344 * (0.764)	0.156 **	1.344 *
<i>SELL_PFB</i>	-1.047 * (0.605)	-1.669 ** (0.692)	0.351 *	-1.669 **
<i>SELL_ACJ</i>	-1.429 * (0.765)	-0.923 (0.968)	0.240 *	-0.923
<i>SELL_PN</i>	0.125 (0.622)	-2.829 ** (0.789)	1.133	-2.283 **
<i>INC_FM</i>	0.013 * (0.008)	-0.077 ** (0.038)	1.013 *	-0.148
<i>INC_FM</i> ²		0.001 ** (0.000)		
<i>MGR_SAT</i>	0.840 (0.561)	-0.605 (0.673)	2.316	-0.605
Farmers Market Characteristics				
<i>MGR_TIME</i>	-1.547 (1.150)	2.334 * (1.333)	0.213	2.334 *
<i>VEN_NO</i>	0.106 ** (0.037)	0.044 (0.039)	1.112 **	0.196
<i>MKT_AGE</i>	-0.232 ** (0.085)	0.048 (0.090)	0.793 **	0.108
<i>AM_COUNT</i>	0.694 ** (0.225)	-0.228 (0.244)	2.001 **	-0.412

^a Vendor satisfaction is modeled assuming a Logit distribution with three dependent variable categories (very satisfied, satisfied, not satisfied), while sales per customer is modeled using Ordinary Least Squares (OLS). Standard errors for parameter estimates in parentheses, * sig at 10%, ** sig at 5%

^b Elasticities computed at variable means

Table 4 (continued)

Regression results from subjective and objective vendor performance models, and estimated logs odds ratios (subjective) and elasticities and marginal effects (objective).^a

Variable	Vendor Performance Model Parameter Estimates		Logs Odds Ratios	Elasticities or Marginal Effects ^b
	Vendor Satisfaction	Sales per Customer	Vendor Satisfaction	Sales per Customer
Farmers Market Characteristics (continued)				
<i>VEND_CO</i>	0.086 ** (0.040)	-0.049 (0.045)	1.090 **	-0.097
<i>VEND_NCO</i>	0.046 ** (0.019)	-0.025 (0.019)	1.047 **	-0.115
<i>PRDRQT</i>	-0.950 (1.596)	-2.602 (1.741)	0.387	-0.446
Customer Characteristics				
<i>APA_LT25</i>	-0.044 * (0.024)	0.008 (0.028)	0.957 *	0.178 *
<i>TRVL_LT5</i>	0.032 ** (0.016)	-0.005 (0.019)	1.033 **	-0.076 **
<i>Intercept1</i>	-3.650 (3.039)	7.807 ** (3.676)		
<i>Intercept2</i>	0.706 (3.020)			
<i>R-squared</i>	0.393	0.448		
<i>N</i>	103	93		

^a Vendor satisfaction is modeled assuming a Logit distribution with three dependent variable categories (very satisfied, satisfied, not satisfied), while sales per customer is modeled using Ordinary Least Squares (OLS). Standard errors for parameter estimates in parentheses, * sig at 10%, ** sig at 5%

^b Elasticities computed at variable means

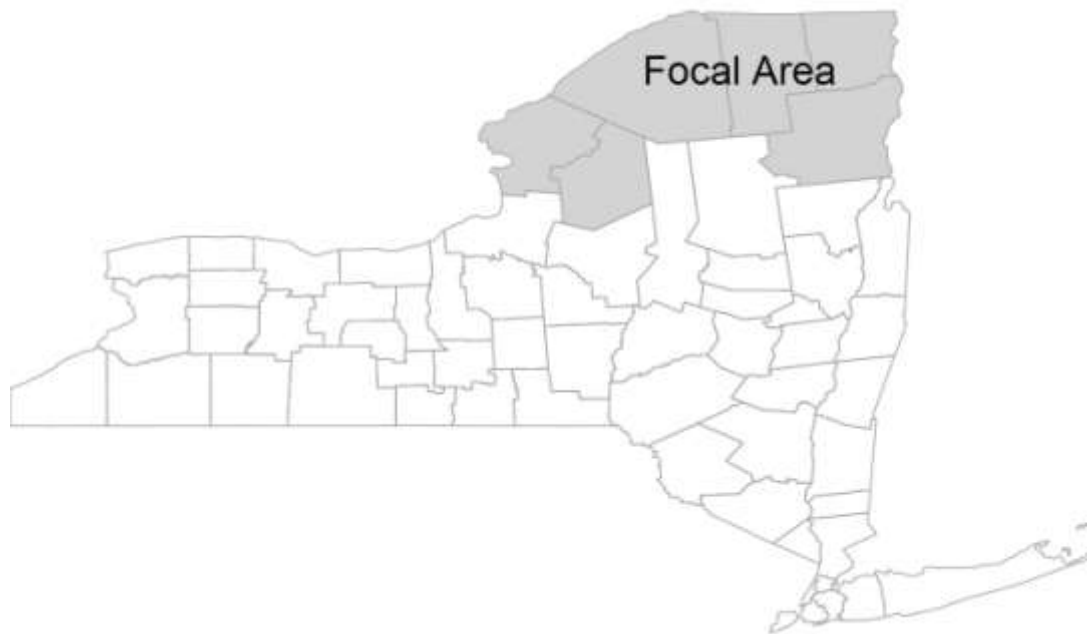


Fig. 1. Map of New York State and the focal counties.

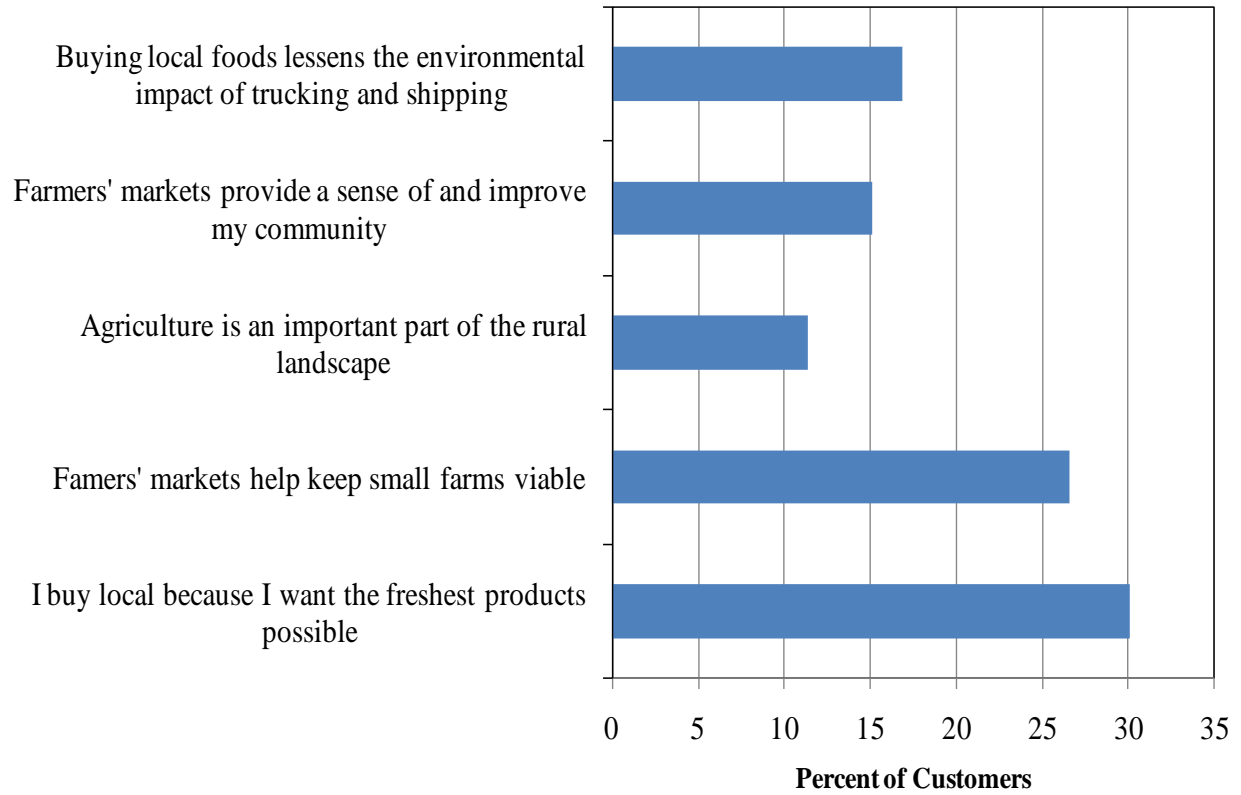


Fig. 2. Northern New York farmers market customer survey response of what best describes the customer's farmers market experience, 2008.

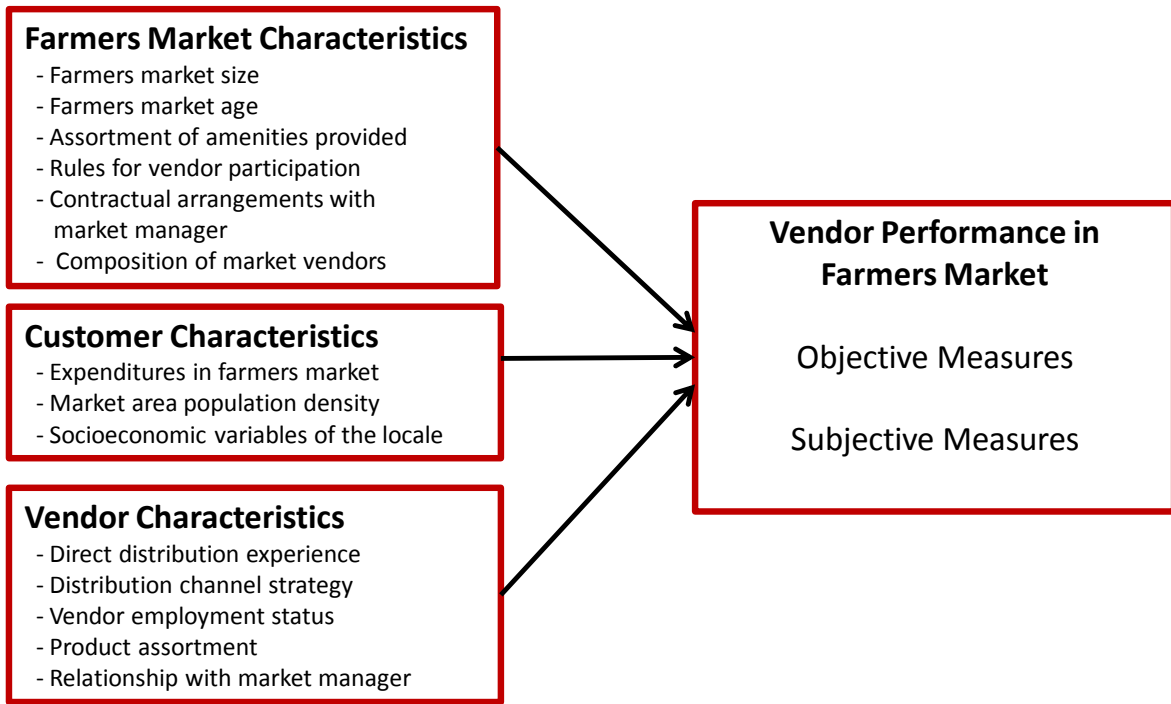


Fig. 3. Conceptual framework for evaluating farmers market vendor performance.

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