Factors Affecting the Number and Type of Small-Farm Direct Marketing Outlets in Mississippi

Tamekia K. Morgan and Dovi Alipoe

The objective of this study was to delineate and measure the effects of selected economic and demographic characteristics of Mississippi counties on the number and type of direct marketing of fruits and vegetables. A combination of primary data collected through a survey of county agents and secondary data from government sources were assembled to achieve the objective. Regression equations representing pick-your own marketing, farmer's markets and farm stands were estimated with the iterative three stage least squares technique. Results indicated that economic factors such as income, employment, acreage, and demographic factors (e.g., total population of county, and the size of cities and towns within county boundaries) have varied impacts on the different types of direct marketing.

Consumption and demand of fresh vegetables and fruits continue to show strength. The steady demand for these farm products is due to consumers' continued awareness of the health benefits of daily consumption of fruits and vegetables. Per capita consumption of all vegetables in the United States amounted to 282.4 pounds in 1996. This total consumption encompassed 153.5 pounds of fresh produce 23.5 pounds of frozen products and 105.4 pounds per capita of canned vegetables, (USDA-NASS, 1998). The composition the different types of produce purchased by consumers has fluctuated over the years. For example, fresh produce represented 50.7 percent of all vegetables consumed in 1983,and 54.4 percent of per capita vegetable consumption in 1996.

The steady demand for vegetables and fruits, especially fresh produce, presents new and renewed opportunities not only for farmers in the traditional vegetable production regions, but also for small farmers operating in states that are located outside of the traditional production regions. Agriculture in the southern United States (including Mississippi) is mostly characterized by a dichotomous farm structure, whereby large farms (a small percentage of all farms) are concentrated in the traditional crops, while small farms (constituting a large percentage of all farms) concentrate on alternative enterprises, and alternative marketing and management techniques. Furthermore, a large proportion of these small family farms depends on off-farm owned or family income to supplement on-farm revenues.

The authors are, respectively, former graduate assistant (currently at John Deere), and associate professor (Agricultural Economics and Agribusiness).

Vegetables and fruits are raised by small farmers in Mississippi as alternative crops because these enterprises have the potential to yield relatively high income on small acreage. Total acreage of vegetables in the state amounted to approximately 6,400 acres in 1996. Some tree fruits and melons are important in the state in terms of output and farm income. For example, the state has ranked in the top ten in watermelon production in recent years. In alternative enterprise production, marketing remains one of the principal determinants of the profitability of the farm business. Farm marketing encompasses a wide range of strategies and decisions to incorporate market selection, timing of availability and delivery, choice of market risk management tools, value added, etc... Small farmers in the southern region have reported various problems in marketing alternative crops (Thompson,1980; Demessie, 1990; Nelson et al., 2000). Some of these problems include lack of market access, inadequate information; low bargaining power and unfair prices, producers' perceptions of costs and returns in direct marketing, and the availability of technical assistance and grants for direct marketing support.

The total value of agricultural products sold directly to consumers by Mississippi farmers amounted to 2.4 million (USDA-NASS, 1997). This amount of direct sale represented less than one percent of the total sale of agricultural products at the farm level in the state. Direct marketing allows the small farmer to connect with the consumer, circumventing the marketing middlemen. Direct marketing, therefore, adds value to the farm product and has the potential to increase small farm income.

Through direct marketing, the farmer will perform some or all of the critical marketing functions between the farm gate and the final consumer. Some earlier studies have revealed that direct marketing is quite important for growers of some commodities in some areas , e.g., Henderson and Linstrom (1980); O'Rourke (1980); LeVeen and Gustafson (1978). More recently, McLaughlin et al. (1997) estimated that nationwide direct marketing of fresh produce by farmers amounted to approximately $1.1 billion.

From the consumers' perspective, there has been a resurgence of direct marketing because it provides cheaper and fresh wholesome products that are usually grown locally. Furthermore, value-adding activities of small producers give the product homemade processed characteristics (e.g., jellies, jams, pickled products, etc.). Also, some consumers enjoy the recreational aspects associated with buying direct from farmers. The utility derived from these recreational activities may add to the demand for small -farm direct marketing. Currently, there is a lack of knowledge about the spatial distribution of the various types of direct marketing at the county level in Mississippi. In addition, the economic, demographic and other factors affecting direct marketing at the county level are not fully known. Such knowledge has the potential to contribute in policy and program implementation to improve the economic welfare of small farmers in the state.

Objectives

The overall objective of this study was to generate new knowledge about direct marketing by small farmers in Mississippi. More specifically, the objectives of the study were:

(1) To identify the economic and demographic factors affecting the number of direct marketing outlets of fruits and vegetables in Mississippi counties;

(2) To measure the effects of these factors on the number of small-farm direct marketing outlets;

(3) To assess the competition between direct marketing by small farmers and consumer purchases of vegetables and fruits from the traditional mainstream grocery stores and supermarkets.

Methods and Procedures

Direct marketing outlets covered in this study are the pick-your-owns, farm stands, roadside stands and sale by small producers at local farmer's markets. Other forms of small-farm direct marketing (not addressed in this study) include selling specialty products to retail stores, restaurants, institutions, and to consumers through mail order. All direct outlets allow the farmer to sell to consumers or to consuming establishments while bypassing the typical marketing channels. These channels usually exhibit one or more of the following sequences: grower-broker-wholesaler-independent retailer; or grower-broker-wholesaler-institutional buyer; or grower-chain grocery wholesale house - chain grocery retail, etc...

The factors affecting direct marketing were delineated by developing a conceptual model and estimating the parameters of the model. The conceptual model included three endogenous variables that were explained within the system. These endogenous variables are: (1) the number of pick-your-own farms in the county (PYO); (2) the number of farmer's markets in the county (FM); and (3) the number of produce farm stands and roadside stands reported within county boundaries (FS). The conceptual model of a system of three stochastic equations and one identity is shown below:

$$\text{Eq. 1: } PYO = f(FS, FM, X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, U_1)$$

$$\text{Eq. 2: } FS = f(PYO, FM, X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, U_2)$$

$$\text{Eq. 3: } FM = f(PYO, FS, X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, U_3)$$

$$\text{Eq. 4: } TD = PYO + FS + FM \text{ (Identity)}$$

Data on the endogenous variables of the system were obtained from a survey of county agents conducted in summer and fall 1999. The primary data on these variables were collected by regular postal mail and e-mail. The data on the exogenous variables of the system were assembled from government publication sources and thus, are mainly secondary data. These sources include the Agricultural Census (USDA-

NASS, 1997), the Regional Economic Information System Bearfacts and U.S. County and City Data (U.S. Department of Commerce, 1998). The exogenous variables of the system and their units of measurement are the following:

X_1 = Acreage of vegetables, sweet corn and melons harvested for sale in the county, 1997, acres;

X_2 = Orchard land in the county, 1997, acres;

X_3 = Number of grocery stores and supermarkets within county boundaries;

X_4 = Per capita personal income of county residents, in dollars;

X_6 = Population of county;

X_7 = Number of towns within county boundaries with a population of 1,500 or less;

X_8 = Number of towns within county boundaries with a population of 1,500 to 2,999;

X_9 = Number of towns in county with a population of 3,000 to 9,999;

X_{10} = Number of towns in county with a population of 10,000 to 19,999;

X_{11} = Number of towns with a population of 20,000 to 49,999;

X_{12} = Number of towns in county with 50,000 people or more;

X_{13} = Change in per capita income of county from 1987 to 1997, dollars;

X_{14} = Average income growth of the county in the past ten years, percent;

X_{15} = Number of orchard farms in the county;

X_{16} = Number of vegetable and melon farmers in the county;

X_{17} = Full-time and part-time employment in the county;

X_{18} = Percentage change in full time and part time employment in the county from 1996 to 1997.

U_1, U_2, and U_3 are the error terms associated with the stochastic equations and TD is the sum of all direct marketing outlets in the county.

The empirical model was estimated with the iterative three stage least square (I3SLS) approach. This approach was selected because it gave relatively better results than seemingly unrelated regression, three stage least squares and ordinary least squares. The model was estimated by Shazam Econometrics Computer Program. Due to missing data, the estimation process encompassed 79 observations on the endogenous and the exogenous variables of the system. These 79 observations represent 79 of 82 counties in the state of Mississippi. The estimated model was evaluated by the following criteria: (1) the signs of the estimated regression coefficients, (2) the t-test for the statistical significance of each estimated regression coefficient, (3) the magnitude of the estimated regression coefficients, (4) the system's coefficient of determination depicting the percent of explained variations attributable to the three stochastic equations.

Results

Farmers markets are generally permanent geographic sales locations with protective shed for display and sale, parking areas, security forces, restrooms and more. Some farmers markets are more equipped than others are, depending on the initial investment. Most farmers markets are located in or near urban areas, and the facilities are owned by state or local governments. Some may be owned by private or cooperative groups. In most instances, farmers pay fees for use of space. Some markets are open every day of the week, but most are open only on certain days.

Pick-your-own (PYO) operations are markets where consumers go into the producer's field or orchard to pick the fruits and vegetables. In PYO marketing, the consumer bears a large percentage of the harvesting costs involved. The farmers usually will prepare the filed for PYO marketing by clearing and weeding, partitioning of field to delineate the areas that are ready for harvesting.

Furthermore, PYO marketing requires that the farmer provide minimal supervision or harvesting information to the customer so as to reduce produce loss. Preliminary results of the small farm direct

marketing survey in Mississippi indicated that the three most popular products sold via pick-your-own were: blueberries, muscadine grapes and Christmas trees. Other products sold by small farmers via pick-your include: field peas, pears, sweet corn, blackberries etc...

Farm and roadside stands are usually located near the farm or set up on the highway or on major city arteries with abundant traffic. Farm stands and roadside stands may vary from small units selling one or two products to a diversified line of several raw farm produce or processed (value-added) products. According to the small farm survey results, farm stands and roadside stands sold watermelon, blueberries, field peas, tomatoes and vegetables and fruits that are in season.

Summary statistics on the endogenous variables of the model are presented in table 1. The minimum number for each of these variables is zero, indicating that some of the counties do not have any pick-your-own, farm stands or farmers markets. In sum, 24 counties reported no pick-your-own operations, 21 counties had no farm stands, while 39 (nearly half of the counties in the state) had no farmer's markets. The highest number of farm stands (31) occurred in Simpson County located in the south central part of the state. Also, Lauderdale County located in central Mississippi had the highest number of farmers markets. Greene county located in the southeastern region near the Alabama State line reported the highest number of pick-your-owns operations in the state. Table 3 shows the estimated I3SLS equations for the system. The statistical unit in the analysis is the county. The three stochastic equations are examined, then some implications are drawn regarding the strategic location of marketing outlets by farmers. The system's R-Square indicates that 67.08% of the variations in the number of pick-your-owns, farm stands, and farmer's markets in Mississippi counties are explained by the set of exogenous variables in the system.

In the pick-your-own equation, the following variables have estimated coefficients that are statistically different from zero at the 0.05 level of probability: FM, X_3, X_8, X_9, X_{12}, X_{13}, X_2, X_1, and X_{18}. The farmer's market variable (in the pick-your-own equation) indicates that there is competition between farmer's markets and pick-your-own operations. Each additional farmer's market in the county causes the number of pick-your-own operations to decline by 6.455 units, all other factors held constant. In contrast, the coefficient of grocery stores/supermarkets although statistically different from zero, is positive, indicating some complementarity between pick-your-owns and grocery stores/supermarkets. It appears that total county population does not have an impact on the number of pick-your-owns located within county boundaries. However, the size of towns and cities in the county affect pick-your marketing. More specifically, cities with population of 50,000 or more have a negative effect (-58.319) on the number of pick-your-owns in the county, whereas small population centers (towns of 1,500 or less) have a positive effect (2.124) on the dependent variable.

Table 1. Summary Statistics on the Endogenous Variables of the System: Pick-Your-Owns, Farm Stands/Roadside Stands, Farmer's Markets.

Endogenous Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
PYO	79	2.9114	3.5848	0.00000	17.000
FM	79	1.1772	1.7957	0.00000	9.0000
FS	79	5.9367	8.2047	0.00000	31.000

Table 2. Summary Statistics on the Exogenous Variables of the System.

Exogenous Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
X_1	79	59.899	113.76	3.000	640.00
X_2	79	39.861	130.29	0.00000	1062.0
X_3	79	27.342	22.852	1.00000	145.00
X_4	79	16332	2566.5	10729	23125
X_6	79	34758	37700	6650.0	0.24714
X_8	79	0.59494	0.80891	0.00000	4.0000
X_9	79	0.55696	0.71157	0.00000	3.0000
X_{10}	79	0.30380	0.60668	0.00000	3.0000
X_{11}	79	0.12658	0.37097	0.00000	2.0000
X_{12}	79	0.012658	0.11251	0.00000	1.0000
X_{13}	79	6827.5	1428.3	3801.0	9799.0
X_{14}	79	5.5367	0.71346	3.7000	8.0000
X_{15}	79	6.4304	12.126	0.00000	103.00
X_{16}	79	5.7215	6.1684	3.000	28.000
X_{17}	79	17970	25963	1942.0	0.18517
X_{18}	79	1.6394	2.4972	-7.3000	8.2000

Table 3. Iterative Three-Stage Least Square Equations of Selected Factors Affecting the Number and Type of Direct Marketing of Fruits and Vegetables Outlets in Mississippi.[a]

Explanatory Variable	Pick-Your-Own	Farm Stands	Farmer's Market
Constant	-14.292	-2.849	-3.0718
	(-1.966)**	(-0.3118)	(2.585)**
FM	-6.4557	-0.25010	
	(-3.4670)**	(-0.13841)	
X_3	0.34377	0.15122	0.059638
	(3.4079)**	(1.1769)	(5.2063)**
X_6	0.85734E-05	0.53686E-04	-0.80701E-06
	(0.21410)	(0.89734)	(-0.082416)
X_7	0.74489	-0.73555	0.14454
	(1.2489)	(-0.90473)	(1.1467)
X_8	2.4482	-1.8882	0.46169
	(2.1240)**	(-1.3342)*	(2.4669)**
X_9	-3.9207	-2.7380	-0.49923
	(-3.1514)**	(-1.5897)*	(-2.0783)**
X_{10}	0.17962	-0.68617	0.16376
	(0.14763)	(-0.32526)	(0.47888)
X_{11}	4.4779	-7.2909	0.87746
	(1.2545)	(-1.3680)*	(1.0533)
X_{12}	-58.319	-19.305	-9.2398
	(-3.6148)**	(-0.91523)	(-4.3787)**
X_{13}	0.20052E-02	(2.0776)**	
X_{14}	1.5869	0.41674	
	(1.0879)	(2.0374)**	
X_2	-0.010496	-0.011675	-0.12552E-02
	(-2.4271)**	(-1.7054)	(-1.1869)
X_1	0.039712	0.018917	0.38679E-02
	(5.0944)**	(1.8321)**	(3.1088)**
X_{18}	-0.37012	-0.53541	-0.040951
	(-1.7999)**	(-1.5092)*	(-0.72093)
System R-Square		67.08%	

[a]The calculated t-ratios are in parentheses below the regression coefficients.
** Significant at 0.05
* Significant at 0.10

Similarly, the economic viability of the county's economy and the purchasing power of its inhabitants have a positive impact on the demand for PYO marketing. Each $1000 dollars increase in the mean county per capita income increases PYO numbers by two. As expected, the acreage of vegetables and melons harvested in the county is positively related to PYO marketing. Each 100-acre increment in the area of vegetable harvested increases the number of PYOs by 3.9.

Contrary to per capita income, the change in county full-time and part time employment has an adverse effect on the number of PYOs. The number of PYOs would decrease by 3.7% in response to a 10 % increase in full and part time county employment.

In the stochastic equation describing farm stands, acreage of vegetables and melons has a positive coefficient, statistically significant at the 0.05 level of probability. A 100-acre increment in the acreage of vegetables harvested in the county produces one to two new farm stands/roadside stands. Also in the same equation, the following variables have coefficients that are statistically different from zero at the 0.10 level of significance: X_8 (towns with a population of 1,500 to 2,999), X_9 (towns with population of 3,000 to 9,999), X_{11} (towns with population of 20,000 to 49,999), X_{18} (change in full-time and part-time employment). Similarly to PYOs, total county population appears to have no effect on farm stands. However, X_8, X_9, and X_{11} have adverse impacts on the number of farm and roadside stands within county boundaries.

The dependent variable in the equation shown in the far left of table 3 is the number of farmer's markets within county boundaries. The equation reveals the following major points: (1) there appears to be no real competition between farmer's markets and grocery stores/supermarkets in filling consumer demand for food, the regression coefficient associated with X_3 being positive and statistically different from zero; (2) total county population does not affect the number of in-county farmer's markets; (3) small towns with population of 1,500 to 9,999 and cities of 50,000 and above have adverse effects on the number of in-county farmer's markets; (4) a 1000-acre increment in acreage of vegetables and melons would increase the number of farmer's markets by three to four; and (5) income growth of the county has a positive effect on the number of farmer's markets.

Pertaining to the third objective, it should be noted that the results obtained in this study do not corroborate the hypothesis of intense competition between farmer's markets and grocery stores/supermarkets, nor the competition between these retail stores and pick-your-own operations. This may be due to the limited types of commodities sold by the PYOs. It should be noted also that in actuality the bulk of the produce consumed in the state is purchased from the grocery stores and supermarkets. PYOs, farmer's markets and farm stands are patronized by a small percentage of consumers. Furthermore, the economic and demographic forces affecting the mainstream retail stores also impact on direct marketing giving rise to a positive association.

The geographic location of direct marketing outlets is one of the key determinants of success. For example, it is recommended to locate farmer's markets in or near towns or cities with a large enough population base. The largest city in the state is Jackson located in Hinds, county. According to the survey of county agents, Hinds County has one farmer's markets, six PYOs, and five operating farm stands/roadside stands. The empirical results indicate a negative relation between the large cities (population of 50,000 or more) and the number of PYOs and farmer's markets. On the other hand, small towns (population o 1,500 to 2,900) appear to have a positive effect on the number of PYOs and farmer's markets. In the final analysis, the strategic location of farmer's markets should be near population centers, if the examination of consumers' perceptions and wants suggest a strong demand for the facilities and the proposed location. However, rural communities could also have successful farmer's markets, if they are properly planned and supported by adequate market research and promotional efforts.

Conclusion

Direct marketing has the potential to increase small farm income since it allows the farmer to capture a larger proportion of the final consumer's dollars. The study reveals that key characteristics of Mississippi counties have positive or adverse impact on the number of pick-your-owns, farm and roadside stands and farmer's markets within county boundaries. Even though the statistical unit of research is the county, it should be noted that demo-

graphic and economic forces occurring in one county may affect direct marketing at locations nearby in another county. As the demographics, and economic and agricultural activities change in the counties, a cautious and critical look should be given to direct marketing (among other strategies, e.g., cooperatives) as a way of empowering farmers in the marketing system. Furthermore, rigorous analyses of the micro aspects of the demand side of direct marketing, (e.g., consumers perceptions of direct outlets, willingness to pay, distances willing to travel, value added, food safety and quality issues, etc.) should precede recommendations regarding the strategic location of direct outlets in rural areas.

References

Demessie, E. 1993. "Marketing Alternatives and Practices of Small-Scale Farmers in Maryland." *Proceedings of the 50th Agricultural Workers Conference*, pp. 111–28, N. Baharanyi, R Zabawa, and W. Hill, eds.

Henderson, Peter L. and Harold R. Linstrom. 1980. "Farmer-to-Consumer Direct Marketing in Six States." *U.S. Department of Agriculture, Agriculture Information Bulletin No. 36.*

LeVeen, Philipp E. and Mark R. Gustafson. 1978. "The Potential Impact of Direct Marketing Policies on the Economic Viability of Small Fruit and Vegetable Farms in California." *University of California, Gianini Foundation Report No. 327.*

McLaughlin, Edward W., Kristen Park, and Debra J. Perosio. 1997. *Marketing and Performance Benchmarks for the Fresh Produce Industry.* Produce Marketing Association, Newark, DE.

Nelson, Bills, Monika Roth, and Jane Maestro-Sherer. 2000. *Direct Marketing Today - Challenges and Opportunities.* U.S. Department of Agriculture, Agricultural Marketing Service.

O'Rourke, Desmond A. 1980. "The Role of Direct Marketing in Washington Agriculture." *Washington State University, College of Agriculture, Research Center Bulletin 0890.*

Thompson, A.R. 1980. *Marketing and the Small Farmer.* National Rural Center, Washington, DC.

USDA-NASS (U.S. Department of Agriculture-National Agricultural Statistics Service). 1998. *Agricultural Statistics.*

USDA-NASS (U.S. Department of Agriculture-National Agricultural Statistics Service). 1997. *Census of Agriculture.*

U.S. Department of Commerce. 1998. *County and City Data Book.*