

A FACTOR ANALYSIS OF THE PERCEIVED PERFORMANCE
OF WESTERN NURSERY STOCK SUPPLIERS*

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A. E. Research Series No. 92-6

June, 1992

* Presented as a Selected Paper for the Fourth Annual meeting of WRCC-72, Agribusiness Research Emphasizing Competitiveness, Las Vegas, NV, June 15-16, 1992.

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INTRODUCTION

The nursery crop industry has been an increasing component of the United States agricultural sector over the past 30 years. In terms of relative importance, greenhouse and nursery products expanded from 1.9 percent of total U.S. commodity receipts in 1960 to 4.7 percent in 1990. During this same period, grower cash receipts increased 181 percent in real dollar terms, for an annual average growth rate of about 6 percent. In the Pacific Northwest, grower cash receipts exceeded the national trend for this period, and grew about 10.8 percent per year (Johnson; Strickland, Johnson and Williams).

Competition in marketing nursery crops continues to intensify as an increasing number of growers seek to diversify their farm income. In a Pennsylvania study, the number of certified nurseries and dealers in that state increased 13.5 percent between 1985 and 1989. However, gross receipts increased just 3.7 percent (American Nurseryman). Thus, the industry is growing but is becoming increasingly competitive.

Due to the rapid growth of the landscape plant market, nursery stock growers need to address the relative importance of product attributes and desired services demanded by their customers. In addition, understanding buyer behavior is critical in a business with a lead time from propagation to market often being the longest of any industry (Phelps). The objective of this study was to quantify characteristics of nursery stock suppliers that are important to garden center and landscape firms.

PREVIOUS WORK

In spite of the growing importance of this commodity group, little empirical work has been done to assess attributes of the market for greenhouse and nursery products. Turner, Dorfman and Fletcher used telephone survey data to investigate target markets for retail outlets of landscape plants using a tobit model. Results indicated that mass merchandisers and large lawn and garden centers should look at population characteristics of surrounding neighborhoods when making the decision where to locate.

Prince, Tayama and Grabner investigated retail florists' performance ratings of services provided by wholesale growers, wholesale florists, and grower-shipper/brokers. They applied a factor analysis to survey data and identified three major independent classes of service: 1) physical distribution, 2) marketing, and 3) product quality. Florists rated the performance of suppliers' physical distribution services higher than marketing services and product quality. Florists' perceptions of physical distribution services and product quality were similar for the three supplier groups, but wholesale growers were rated higher in performing marketing services.

Gineo identified product characteristics that influenced purchase decisions of Connecticut landscapers and retailers when buying nursery stock from wholesalers. Conjoint analysis was combined with a regression model to analyze eight product and service attributes. Results indicated that the dominant characteristic of buyer preference was plant quality. Other

factors which significantly influenced buyer behavior were offering a full line of plants, size of plant, origin of the plant, plant price, and the option to pay for purchases with cash. Bryan and Brooker surveyed 90 nurseries in Tennessee using personal interviews. Though descriptive in nature, their study suggested further research was needed concerning the marketing infrastructure of the nursery industry.

RESEARCH DESIGN AND DATA

The research in this study focused on garden centers' and landscape contractors' perceptions of the products and services provided by nursery stock growers and wholesaler suppliers, hereafter referred to as plant suppliers. Data were provided by a 1990 mail survey of garden centers and landscaping contractors in selected trade centers in several western states. The survey instrument was pretested before distribution to managers of landscape firms and garden supply stores. Surveys were sent to targeted businesses in Idaho cities with populations greater than 15,000 and regional trade centers in the intermountain region including: Anchorage, Alaska; Denver, Colorado; Billings, Great Falls and Missoula, Montana; Reno, Nevada; Salt Lake City, Utah, Spokane, Washington; and Casper and Cheyenne, Wyoming. A total of 549 questionnaires were sent to landscape and garden center businesses identified from state nursery lists and telephone directories. A total of 421 of the identified companies were eligible to participate in the survey. The response rate was 73.9

percent, with 311 completed surveys returned.

Respondents were asked about their type of business, seasonality (open all year or not), how long their firm had been in existence, business location, and annual sales volume. In addition, firms were asked to indicate the relative importance of 35 attributes associated with their purchase of nursery stock from plant suppliers.

The questionnaire used a four point Likert-type scale for ranking the relative importance of the 35 selected attributes in respondents' nursery stock purchasing decisions. The scale ranged from 1 to 4, with 1 being "very important," 2 "moderately important," 3 "slightly important," and 4 being "not important."

The data were factor-analyzed to yield classifications of product characteristics and wholesaler services in nursery stock markets. Factor analysis is a multivariate statistical technique concerned with the identification of structure within a set of observed variables. Factor analysis involves the study of interrelationships among variables in an effort to find a new set of variables, that are fewer in number than the original variables, but which reveal a relationship among the original variables (Stewart). This revised structure can be used to represent relationships among the original variables, thereby reducing the complexity of the data.

RESULTS

A first-order factor analysis of the 35 product and service

attribute measures identified six first-order factors. Factor rotation led to the deletion of 10 items or attributes due to insignificant loading on any factor. The standardized Cronbach's alpha was used to evaluate the internal consistency of the set of variables in each factor (Cronbach). The higher the standardized alpha, the higher the correlation between the items within the factor (standardized item alphas are reported in Table 1). Two characteristics were dropped as components of factors because they were weak in the factor loadings, had limited appeal in an intuitive sense and their deletion had little effect on the corresponding Cronbach alpha. These characteristics were: the importance to buyers of plants free of weeds, and the importance to buyers of plants damaged during shipping.

The final varimax (orthogonal) factor rotation retained 23 items in the six first order factors (Table 1). These attributes included: plant selection; product information; supplier services and knowledge; advertising and promotion support; plant quality; and product ordering. The reduced set of factors explained 43 percent of the variance in the original set of attributes.

The factors thus identified would align well with business functions within a firm. Plant selection would fall under the auspices of production, advertising and promotion would obviously fit under advertising and public relations, plant quality would be the responsibility of quality control, product ordering would go with customer service, and the sales area would be accountable for supplier services and knowledge.

To further define product and service classes, a second factor analysis, like the first, was performed on the first-order results. This procedure was used to identify latent interrelationships among the set of factors found in the initial analysis. This analysis is intuitively appealing since the first-order factor solution identified a structure of service attributes with some of the factors being related. For example, product information should be related to supplier services and knowledge. This relationship was identified in the second order factor analysis. An oblique (nonorthogonal) factor analysis collapsed the six first-order factors into three second order factors (Table 2). These were: buyer-oriented services, buyer perception of supplier characteristics and sales support. An oblique solution was necessary due to the high correlation of factor 3 with factors 1 and 2 and between factors 1 and 2 alone, as evidenced by the factor correlation matrix (Table 3).

In order to better understand the ranking of preferences of the second-order factors as seen by the firms in the survey, an average was taken of the responses for each attribute regarding their importance, and then the components of each factor were averaged again. Based upon mean responses, the "buyer oriented services" factor was ranked as most important by the surveyed firms (Table 4). This factor incorporated plant selection, production information provided by the wholesaler, and supplier services and knowledge as underlying attributes.

The "buyer perception of supplier characteristics" factor was

placed second based upon the mean of respondent rankings. This factor included advertising and promotion support along with plant quality as fundamental attributes. The second-order factor regarded as least important by the retail landscape and garden centers was the factor "sales support," which was comprised of the single elemental attribute of ordering services.

CONCLUDING COMMENTS

Previous analysis with these data was unsuccessful in segmenting the retail garden center and landscape market by firm size, business type or geographic location (Makus et al.). However, based upon the analysis conducted in this study, paying attention to buyer-oriented services appears more beneficial to nursery stock suppliers than focusing on the firm's reputation and ordering services. These latter two attributes were still considered important, but less emphasis was given them by respondents in this study.

As was mentioned earlier, several supplier characteristics were dropped from the first order factor loadings. These characteristics did not load sufficiently on any factor due to low variability in the responses. The eliminated characteristics were consistently viewed as either very important or relatively unimportant by all respondents. Two examples of such attributes were: plants free of insects or diseases and plants free of weeds. Both attributes were ranked as highly important by over 90 percent of the respondents. However, neither attribute loaded on any of

the first order factor groupings because of the consistent response pattern. Such characteristics seem to be so obviously necessary as to be a requirement for being a nursery stock supplier. The implication is that a supplier must meet buyer expectations on some basic characteristics. Failure to do so would place the firm at a severe competitive disadvantage.

As indicated in the introduction, the nursery market is a growing but increasingly competitive market. The classifications of plant supplier attributes outlined in this analysis can provide the nursery stock industry with useful information which the astute supplier can incorporate into a successful business strategy.

Table 1. Loadings of Product and Service Attributes on Six First Order Factors^a

First-Order Description	Product and Service Attributes	Factor Loadings						Standardized Item Alpha
		1	2	3	4	5	6	
1) Plant Selection	Wide selection of plant species available	.60						.6616
	Availability of plants in containers instead of balled and burlapped plants	.50						
	Other growers located nearby for additional plant selection	.47						
	Plants available for late season restocking	.44						
	Availability of plants in bloom	.40						
	Plants available when needed	.36						
	Plants available in several sizes	.34						
2) Product Information	Furnish tags explaining plant characteristics		.74					.6953
	Furnish catalogs with good plant descriptions		.54					
	Furnish plant care instructions		.54					
3) Supplier Services & Knowledge	Notification of order shortages			.51				.5573
	Availability of plants acclimated to your area			.45				
	Supplier knowledgeable about plant materials			.45				
	Regular contact with plant supplier			.42				
4) Advertising & Promotion	Furnish promotional items				.74			.7179
	Shared advertising				.66			
5) Plant Quality	Plants properly pruned or sheared					.58		.5264
	Properly dug/handled containers or balled & burlapped stock					.44		
	Plants uniform in size and quality					.44		
	Root pruning of large trees before digging					.39		
6) Ordering Services	Major credit cards accepted						.52	.4599
	Availability of toll-free number						.36	
	Availability of FAX number						.36	

^a Principal axis factor model using orthogonal rotation.

Table 2. Loadings of Six First Order Factors on Three Second-Order Factors^a

Second-Order Description	First-Order Factors	Factor Loadings		
		1	2	3
1) Buyer Oriented Services	Plant Selection	.76		
	Product Information	.48		
	Supplier Services & Knowledge	.43		
2) Buyer Perception of Supplier Characteristics	Advertising and Promotion		.58	
	Plant Quality		.40	
3) Sales Support	Ordering Services			.77

^a Principal axis factor model using nonorthogonal rotation.

Table 3. Correlation Matrix of Factors in Oblique Solution

	Factor 1	Factor 2	Factor 3
Factor 1	1.000		
Factor 2	.3733	1.000	
Factor 3	-.4581	-.3332	1.000

Table 4. Perceived Performance of Supplier Product and Service Attributes by Factor

	<u>Average Response^a</u>	<u>Average Response for Factor^a</u>
Buyer-Oriented Services		1.70
Plant Selection	1.93	
Product Information	1.73	
Supplier Services and Knowledge	1.43	
Buyer Perception of Supplier Reputation		2.05
Advertising and Promotion Support	2.75	
Plant Quality	1.35	
Sales Support		2.80
Ordering Services	2.8	

^a Based upon the scale used to rank the attributes, a lower mean value implies a higher level of importance, thus the average response was calculated as the mean of all the participant's responses, where 1 = "very important," . . . , 4 = "not important." The average response for each factor was calculated as the simple average of the importance of the attributes which comprised that factor.

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