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Consumers Preferences for Plant Size, Type of Plant Material and Design Sophistication in Residential Landscaping[1]

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Abstract

How much value do consumers place on a good landscape? Self-selected attendees to a Detroit, MI, flower show indicated that plant size was the most important factor in the perceived value of a landscape. Holding other factors equal, increasing from the smallest size plant generally available for installation to the largest size defined in our study increased perceived home value by 5.0%. Design sophistication was almost as important as size. Holding other factors equal, upgrading from a traditional foundation planting to a sophisticated design that incorporated multiple bed and curved bedlines increased perceived home value by 4.5%. The type of plant material used was the least important. The relative importance of plant material selection as a factor contributing value added to the home by the landscape was almost half that of plant size and over 40% less than design sophistication. The conjoint model produced from 158 survey responses predicted that from the least valued landscape to the most valued landscape the perceived value of the home increased 12.7%.

Index words: marketing, consumer preference.

Significance to the Nursery Industry

Anecdotal observation and experience suggest that certain landscape design features impart more value to a client. 'Will I like it?' and 'Is it worth the money?' are questions clients considering landscaping may ask themselves. Understanding which landscape features impart the most value can be a powerful tool to help landscape professionals anticipate and accurately address the question of preference. The relative difference in monetary value a customer perceives as being added to the home by individual features and combinations of features creates a tool that addresses the question of monetary value added by landscaping. With these tools, landscape professionals will be better prepared in the design process and sales encounter to address client's desires. Emphasizing the monetary value the total landscape and its individual features add to the home can help alleviate some of the high level of purchase anxiety. Purchase anxiety often accompanies transactions involving considerable monetary and emotional investments. Conveying the value added by various features may open opportunities to sell a client a higher value landscape. These tools will also guide designers and installers in making design and budget adjustments to minimize impact on the client's perception of the finished landscape's value.

Introduction

Few studies have addressed the monetary value of landscaping. In the 1980s, researchers in environmental psychology and landscape architecture investigated the impact of landscape elements on human emotions and psyche (14, 17). During that same period, forestry researchers quantified the preference for, and monetary value imparted to, property by street trees in primarily residential settings (11, 13, 17). But we have no specific, direct information regarding the perceived monetary value of a landscape.

Henry (9, 10) adapted the same methods used by forestry researchers (13, 17) to help establish a benchmark for residential landscaping value as it relates to property value. These studies reported that for homes similar in location, size and other descriptive variables, those with landscaping rated as good or excellent sold for 10–17% more than those rated as poor or average. Previous research addressed individual questions such as shade tree value and overall landscape value. However, as a whole, the research does not present a cohesive picture of how elements in the landscape interact to alter perceived value. Indeed, previous authors, noting the ef-

[1]Received for publication May 16, 2000; in revised form August 23, 2000. This project was generously funded by **The Horticultural Research Institute, 1250 I St. NW, Suite 500, Washington DC 20005**, and completed under the auspices of S-290 Regional Research Project "Technical and Economical Efficiencies of Producing, Marketing, and Managing Environmental Plants."

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fect of landscape treatment on perceived value of street trees, suggested that future research should focus on disentangling the value of tree size from the value of landscape treatment (17).

One method that could be used to clarify the landscape value question is conjoint analysis. Conjoint analysis is a technique marketers use to investigate the profitability of various new products, segment the market or predict preference for a product (8). Unlike traditional multiple regression, conjoint analysis allows the researcher to define a predetermined set of hierarchical levels for each factor or attribute investigated. The resulting analysis is a flexible model that can predict the utility, defined in our study as monetary value, of a product with attributes at levels specified by the researcher. In horticulture, conjoint analysis has been used to segment the European market for onions (6), predict a consumer demand for blue geraniums (3), investigate consumer preference for packaging of edible flowers (12), and analyze consumer preference for retail evergreen shrubs (5).

The stimuli for a conjoint analysis are generally photographs of the product. Rather than verbally explaining the product features to respondents, each photograph demonstrates a different set of defined features. Computer programs using photo-editing technology to represent finished landscape projects are generally accepted as producing realistic representations. A large body of work exists that indicates evaluations of photographs and computer-enhanced images of landscapes are highly correlated to evaluations of the actual site (13, 14, 16, 23). Previous landscape preference research has used traditional and computer enhanced photographs as experimental stimuli (13, 17).

The working hypothesis was that plant size, design sophistication and plant material type were three measurable factors that together, most accurately and completely defined a landscape. Researchers expected that as each of the three chosen factors moved up through a hierarchy of defined levels the amount that a factor added to the value of the home would increase. Additionally, they hypothesized that the least preferred combination would be a foundation design using small evergreen plants and the most preferred would be a sophisticated design using large plants of diverse types and incorporating colored hardscape. Based on previous observations, researchers expected that as the factor level combinations moved from the least preferred to the most preferred, the value of the home would increase between 10% and 17% (9, 10). Additionally, they expected to gain insight into consumer preferences for different combinations of landscape features by analyzing the relative differences between the values of homes with systematically different landscapes.

Materials and Methods

Generation of orthogonal design, factor level definitions and conjoint analysis. The respondent's overall preference for a particular landscape was defined as the value assigned to the landscaped home by the respondent. Conjoint analysis defines overall preference for a particular product, in this case a landscape, as the sum of the part-worths, also defined as utilities, for each factor level. By design, the sum of the part-worths is analogous to the value added to the home by the landscape as predicted by the conjoint analysis procedure. Plant material size, design sophistication, and type of plant material were chosen as the factors that best describe the attributes of a landscape. An additive model was used, in which the preference for each factor added to form the overall preference, in terms of dollars, for a particular landscape.

For each factor, a measurable, hierarchical set of levels to investigate was identified. The plant size levels were defined as being (1) small, (2) medium or (3) large (Table 1). Design sophistication levels were defined as being (1) foundation planting only, (2) foundation planting with one large, oblong island planting and one or two single specimen or shade trees in the lawn, or (3) a foundation planting with adjoining beds and two or three large island plantings, all incorporating curved bedlines. The type of material used in the landscapes included woody evergreen trees and shrubs, groundcover plants, woody deciduous trees, color from flowering annuals and hardscape in the form of a brick-paved walkway. The material levels were defined as being (1) evergreen and groundcover only, (2) evergreen, groundcover and deciduous plants, (3) evergreen, groundcover and deciduous plants with 20% of the visual area of the landscape beds planted in annual color, or (4) evergreen, groundcover, deciduous plants, 20% annual color and colored hardscape.

By using a partial factorial design, researchers reduced the number of photographs required to maintain orthogonality from 36 to 16. Conjoint Designer version 3.0 produced by Bretton-Clark (4) was used to generate the list of 16 stimuli. Conjoint and all other statistical analyses were accomplished using SPSS 8.0 (21, 22).

Generation of plans and photographs. A two story, newly built home in a Delaware suburb was the test home (Fig. 1). A commercially employed landscape architect prepared 16 flat plans. The designer was given the factor level parameters and definitions for each plan and received a set of guidelines that included incorporating only plants whose hardiness extended from USDA Zones 4–7. The architect used only common plants that are readily available. Computer generated color perspective images of the home and landscaping were prepared from each flat plan using Adobe PhotoShop version 5.0 (1). Each photograph depicted the home and landscaping as viewed from the street, the perspective from which the photo was taken.

Table 1. Horticulture designation for landscape plant-size designations for small, medium and large plants used as three levels for plant-size in the study.

Designation	Plant type	Horticultural size
Small	Deciduous tree (single)	.5–1" caliper
	Deciduous tree (clump)	5–6' tall
	Evergreen tree	18–24" B&B
	All shrubs	1 gal container
	Perennials	2.25" container
	Annuals	2.25" container
Medium	Deciduous tree (single)	2–2.5" caliper
	Deciduous tree (clump)	8–10' tall
	Evergreen tree	24–36' B&B
	All shrubs	3 gal container
	Perennials	1 qt container
	Annuals	1 qt container
Large	Deciduous tree (single)	3–3.5" caliper
	Deciduous tree (clump)	12–14' tall
	Evergreen tree	42–48" B&B
	Specimen shrubs	7 gal container
	Groundcover shrubs	5 gal container
	Perennials	1 gal container
	Annuals	1 gal container

Fig. 1. Base house.

Survey administration and instrument. The survey form and protocol were reviewed and approved by the Michigan State University Committee on Research Involving Human Subjects (UCRIHS). On April 8 and 9, 1999, surveys were administered at the Detroit, Michigan, Bloomfest an annual flower show attracting thousands of people from the Detroit metropolitan area. Detroit is a viable test market, exhibiting characteristics of 'average' or typical U.S. cities (25).

A display table was erected to administer the survey within a full-scale garden display. Visitors were recruited to participate in the survey as they passed the table. The survey consisted of three parts. First, participants were asked to examine a photograph of the survey home with only a lawn and a straight poured cement walk and driveway. Estimated value of the home, hypothetically located in Oakland County, Michigan, was established at $192,000. Researchers also stipulated that it was in a subdivision with similar new homes. The home was described as a 4-bedroom, 2½-bathroom, two-story structure located on a half-acre lot (approximately 100 × 200 ft). Participants were verbally asked to look at the 16 additional photographs. Considering the price of the home assigned by realtors and the landscaping and features around the homes, they were asked to assign a value to each home.

The second part of the survey consisted of a series of questions to assess respondent's gardening involvement and plant knowledge. The third part of the survey asked respondents to provide demographic information about themselves, their family, home, home landscape and landscape service usage.

The 16 photographs were shuffled throughout both days through three different presentation orders to test for possible order effects. Each time 50 surveys were collected the photographs were shuffled. One hundred and fifty-eight usable surveys were collected over a two-day period. Participants were offered a small gift with a value of less than $1.00 for their participation.

Results and Discussion

Demographic profile of respondents. Fifty-nine percent (59%) of the respondents were female, with a mean age of 49 years; 30% stated they were between 46 and 55 years old. Respondents were well educated with 99% stating that they had completed at least 12 years of schooling and 70% had completed at least four more years of schooling beyond grade twelve. Respondents represented a wide range of incomes, but 96% of reported incomes were at or above the national median household ($37,779) (24). Mean household size was 2.7 persons.

A high percentage of respondents, 96%, owned a home and the value of that home was most often $100,000 or more. Substantial groups stated that their primary residence was valued between $100,000 and $149,999 (20%), $150,000 and $199,999 (19%), and $300,000 or more (21%). Individual respondents had owned their home as little as one year through as long as 36 years. On average, respondents had owned their homes 13 years. Respondent residences were scattered throughout the Detroit metropolitan area with larger percentages lying in communities often associated with higher home values.

The average dollar amount spent on lawn and yard products and services in 1998 as reported by respondents was $2,277. Responses ranged from $50 to $50,000. Sixty-two percent had purchased at least one form of landscape service in the past 10 years. The most frequently purchased services were landscape design (25%) landscape installation (23%), and professional lawn care (37%). Almost all respondents (98%) spent on average one hour or more per week on their lawn or garden in the summer months. About 46% spent 1 to 9 hours per week and 52% spent 10 or more hours per week on their lawn and garden.

The respondents in this study were similar to those reported as typical of garden center customers and gardeners (2) and they appeared to have an interest in their home landscape. The 1998–99 National Gardening Survey (15) reported that 1.7% of American households purchased landscape design and 7.4% purchased lawn care services. In this sample, 8.8% had purchased landscape design and 23.4% had purchased lawn care services in the last year. Their decision to attend the Bloomfest is an additional indication of their propensity toward gardening and landscape. Such information suggests that this sample may have had more information than the average person about the cost of landscape materials and the amount of labor required to install landscaping. It

Table 2. Predicted home values and percent increase over home with least value for plant-size, sophistication and plant composition for the landscape designs used in the study.

Plant size	Design style	Plant material	Predicted home value ($)	Increase over least valued home (%)
(1) Small	(1) Foundation	(1) Evergreen	190,949	0.0
		(2) Evergreen & deciduous	192,960	1.1
		(3) 2) plus 20% annual color	193,921	1.6
		(4) 3) plus hardscape	196,248	2.8
	(2) Island	(1) Evergreen	195,885	2.6
		(2) Evergreen & deciduous	197,897	3.6
		(3) 2) plus 20% annual color	198,857	4.1
		(4) 3) plus hardscape	201,184	5.4
	(3) Sophisticated	(1) Evergreen	199,967	4.7
		(2) Evergreen & deciduous	201,979	5.8
		(3) 2) plus 20% annual color	202,939	6.3
		(4) 3) plus hardscape	205,266	7.5
(2) Medium	(1) Foundation	(1) Evergreen	194,417	1.8
		(2) Evergreen & deciduous	196,429	2.9
		(3) 2) plus 20% annual color	197,390	3.4
		(4) 3) plus hardscape	199,717	4.6
	(2) Island	(1) Evergreen	199,354	4.4
		(2) Evergreen & deciduous	201,366	5.8
		(3) 2) plus 20% annual color	202,326	6.0
		(4) 3) plus hardscape	205,266	7.2
	(3) Sophisticated	(1) Evergreen	203,436	6.5
		(2) Evergreen & deciduous	205,448	7.6
		(3) 2) plus 20% annual color	206,408	8.1
		(4) 3) plus hardscape	208,735	9.3
(3) Large	(1) Foundation	(1) Evergreen	200,830	5.2
		(2) Evergreen & deciduous	202,841	6.2
		(3) 2) plus 20% annual color	203,802	6.7
		(4) 3) plus hardscape	206,129	7.9
	(2) Island	(1) Evergreen	205,766	7.8
		(2) Evergreen & deciduous	207,778	8.8
		(3) 2) plus 20% annual color	208,738	9.3
		(4) 3) plus hardscape	211,065	10.5
	(3) Sophisticated	(1) Evergreen	209,848	9.9
		(2) Evergreen & deciduous	211,860	11.0
		(3) 2) plus 20% annual color	212,820	11.5
		(4) 3) plus hardscape	215,147	12.7

also suggests that this sample may be more interested and discerning, with regard to landscaping, than the average person.

Order effects. ANOVA showed no significant differences between responses for each of the three presentation orders. For each of the three presentation orders, the variance of the mean constant value derived from the conjoint analysis ($F = 0.769$, $p = 0.465$) and the variance of the mean predicted home values for the most radically different landscapes, foundation planting with small evergreens ($F = 2.357$, $p = 0.098$) and sophisticated design with large evergreen, deciduous and annual color ($F = 1.074$, $p = 0.344$), show no significant evidence of order effect.

Importance of factors. The defined factors and factor levels accounted for 94.2% of the variance in values placed on the landscapes by respondents (Pearson's R^2). It appears that, for the landscapes presented, the factors of plant size, design sophistication and plant type were good measures of the value added to the home by the landscape. Survey results suggests that 40.2% of the value added by the landscape to the predicted base price of the home is due to the size of the plants, followed by design sophistication accounted (36.5% of the additional value) and plant material type (23.3% of the additional value).

Predicted home values. Over 95% of the respondents stated that any level of landscaping increased value of the home over the suggested base value of $192,000. Conjoint analysis predicted that the pictured home with a hypothetical 'average' landscape would have a perceived value of $202,621 (Table 2). For all factors, the utility value increased as factor levels moved from less sophisticated, less plant variety, and smaller size to more sophisticated, more variety and larger size.

Plant size effects. Plant size was the most important factor in our study. Its importance outweighed that of design sophistication by 3.7% ($t = 2.097$, $p = 0.038$). The conjoint model predicts that, holding all other factors equal, moving from the smallest size plant defined in our study to the largest defined size will increase the perceived value of the home by 5.0%. Large size alone can offset the effects of a foundation planting. Conversely, small size can negate the value gained by using a sophisticated design. In general, respondents were willing to decrease design style by one level to gain an increase in plant size of one level. They were also willing to exchange medium size for small size in return for an upgrade from an evergreen landscape to one that incorporated deciduous species, annual color and hardscape. However, they were not willing to exchange large size for medium size under the same conditions.

Qualitative research cites the most frequent complaint landscape architects receive from clients about their landscape installation is that the size of the plants installed was smaller than specified (7). Not providing a large plant size or cutting back to a smaller plant size when budgets are constrained may disproportionately reduce the client's perception of value in the completed landscape job. Increasing the size of plants installed may result in additional costs above the added cost of plants such as labor and equipment. However, our results suggest that when presented in a landscape context, respondents were able to detect an increase in value that may justify the cost of larger plant material.

Design sophistication effects. Design sophistication was the second most important factor in our study. Design importance was significantly different than material type importance ($t = 9.247$, $p < 0.000$). Holding other factors equal, upgrading from a foundation only planting to a sophisticated design increased the perceived value of the home by 4.5%. Adding curved beds and peninsulas (sophisticated design level) to a landscape already containing one or two island beds (island design level) increased the perceived value of the home by 2.0%. This finding is consistent with qualitative research that suggests consumer preferences are moving away from straight, boxy looks in landscaping to more sinuous and natural curves and forms (19). It is inherent in the definition of design sophistication that a more sophisticated design level will require more plant material. In a study of street trees, researchers found that as the visual density of off-street tree plantings increased, so did viewer's preference for the street scene (20). This suggests that preference for design sophistication, as measured in this study, is a function of both the style and visual density of the landscape.

Plant material and hardscape effects. The type of plant material used was the least important factor in our study. Its importance was 16.9% less than that of plant size ($t = 10.234$, $p < 0.000$). As a factor in the overall value added to the home by the landscape it was almost half as important as plant size and over 40% less import than design sophistication. The range between utilities for the evergreen only level and the evergreen and deciduous level was the second smallest for any pair of contiguous factor levels. Other comparisons of contiguous levels within the factor of plant material were similarly small. These results may suggest that the respondents did not have the knowledge to differentiate between plant types or that plant material was more difficult to judge, due to inexperience, compared to plant size and design sophistication. Alternatively, these results may suggest that respondents were indifferent to the type of plant material used.

Professionals in the landscape trade generally have an appreciation for the diversity of plants. Due to personal preference, they may incorporate a wide variety of plants in their work. However, before incorporating a wide variety of plants into a landscape, it is important to assess whether plant diversity is a concern or interest of the client. If it is not important, incorporating a wide variety of plants into a landscape may not impart much perceived value to the client. If the client is concerned with incorporating a variety of plant types, some tutoring from the professional to recognize and appreciate the diversity may be needed.

The increase between evergreen and deciduous and evergreen and deciduous with 20% color added was the smallest increase between any two contiguous factor levels. Although annual color is the smallest determinant of landscape value, for this home an increase in perceived landscape value of $961 is achieved through the addition of several flats of flowering annual plants. The increase in perceived value between landscapes with hardscape and those without represented an increase of 1.1% over the value of the home. Yet this percentage, a $2,327 increase in perceived value, may not recover the hardscape's real cost.

Overall model predictions. Overall, the model in this study predicts that for the home examined, a foundation landscape with the smallest evergreen plants has a perceived value of $190,949 (Fig. 2). On the other end of the scale, a landscape with a mix of evergreen and deciduous species in the largest size defined in our studied when partnered with annual color and hardscape in a sophisticated design has a perceived value of $215,147. Moving from the least valued combination of factors to the highest valued combination, we observed a

Fig. 2. Evergreen only, foundation, small plant size design.

Fig. 3. Evergreen, deciduous, and 20% annual plants, sophisticated, large plant size design.

12.7% increase in the perceived value of the home. Such observations are in line with previously reported ranges based on real estate sales price data (9, 10). For reference, Fig. 3 shows the second most valued home with a predicted value of $212,820. The photograph of this landscaped home was viewed by the participants and evaluated using conjoint analysis. It is similar to the most valued home in all respects except that it does not possess a brick paver walkway.

Within the conjoint analysis results lies a relative scale of importance and utility that can be generalized to other situations (Table 2). Interpretation of the scale suggests that landscape designers should emphasize plant size over plant type and make design and budget decisions accordingly. It also suggests that much of the perceived value is obtained when plant size is increased or when a simple island design is amended with more sophisticated design features. The scale suggests clients may not value or recognize a wide variety of plants in the landscape. For some clients, paying for increased plant size will take precedence over paying for a diversity of plant types. If a designer or landscaper wishes to increase the perceived value of a landscape job, adding annual color is a cost-effective, quick method. If the homeowner's main desire is return on investment, installing hardscape will probably not return its material and installation costs.

Perceived value is only one important dimension in the landscape value equation. As suggested above, cost is another factor. For most remodeling projects, the portion of their investment homeowners can expect to recoup upon sale of their home has been documented (18). What percent increase over cost do people perceive for landscaping in general? More precisely, at what level of landscaping, in terms of size, plant material and design sophistication, can a homeowner expect to recoup a maximum? Further analysis of these data combined with cost data may yield important information about return on investment. As suggested by Henry's work, this return may also vary with the quality of the surrounding neighborhood (9, 10). Further work could focus on the impact of landscaping on various types of housing and in various neighborhoods.

We have shown that perception of landscape value varies with the type of landscaping. Questions not addressed in this study include, does perception of landscape value vary with respect to the demographic characteristics of respondents? does it vary with respect to geographic region? does it vary with respect to the base value, style or location of the home? If so, such research may refocus on the existing market or may identify new markets for landscape professionals. With renewed interest in remodeling older homes (18), it may be valuable to investigate the effect of adding plants to an existing landscape. Examining the effect of various combinations of plant sizes within the same landscape may provide answers. This study addressed a key piece of the landscape value puzzle, but more work needs to address other pertinent questions.

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