Redirecting University Extension Services to an Alternative Clientele in the Golf Industry

**Cesar L. Escalante, Wojciech J. Florkowski, Gil W. Landry, Jr.
and Pierre I. Boumtje**

Cesar L. Escalante and Wojciech J. Florkowski are Assistant Professor and Professor, respectively, at the Department of Agricultural and Applied Economics while Gil W. Landry, Jr. is Professor at the Department of Crop and Soil Sciences, University of Georgia. Pierre I. Boumtje is Assistant Professor at the Agriculture Department of Southern Arkansas University.

For decades, farmers have been the major beneficiaries of research and educational programs of land-grant universities in the country. However, recent evidence suggests that farmers have started to increasingly rely on information and technical services offered by private companies.

The waning appeal of outreach programs of land-grant universities creates a pressure for these institutions to explore strategies to recapture the market share of its research and outreach programs and its reputation as a leading source of farm business-related information and services. King and Boehlje define this challenge as the identification of a newly defined niche of technology-mediated outreach for broader audience segments. Moreover, in order to maintain its competitive edge, university outreach programs must not only remain free of charge but must also be directed towards a clientele that would substantially benefit from existing products and services being offered by scientists, faculty members and research specialists of such universities.

In Georgia, the proliferation of golf courses in recent years offers good opportunities for clientele diversification for the extension programs of the University of Georgia (UGA). The information demands of this clientele could be adequately serviced by UGA's strong interdisciplinary team of experts in crop and soil sciences, plant pathology and entomology specializing in issues related to the turfgrass industry.

This study capitalizes on the structure and needs of Georgia's golf industry to illustrate the potential feasibility of client diversification strategy involving a non-traditional extension clientele group to sustain demand for university outreach services. This study is based on information collected from a survey conducted among golf course superintendents in the state. Specifically, this study will discern important determinants of the respondents' perceptions of the

significance of extension programs being provided by UGA's Cooperative Extension Service (CES). The results of this analysis will provide important implications on the existence of a potential market niche for the university's outreach programs within an alternative clientele group in the state's golf industry.

The following sections provide a background on the farmers' demand for extension services, present an overview of the existing outreach programs for the state's golf industry, define the empirical framework, and discuss the econometric results and their implications.

The Farmers' Diminishing Demand for Extension Services

Outreach efforts by university specialists and county extension agents have been recognized as one of the most important sources of production and technical information in a 1961 survey reported by Mawby and Haver. More recent survey results, however, indicate a gradual decline in the demand for university outreach services by farmers. In a 1989 survey among farmers in Indiana, Illinois, Iowa and Georgia, competing providers of information from the private sector became increasingly popular among the respondents (Ford and Babb).   A similar survey, conducted in 1991 among farmers in the mid-western states attending the Top Farmer Crop Workshop (Ortmann, et al.), produced average and low importance ratings for university specialists and county extension agents, respectively, as sources of production information.

The farmers' declining demand for university outreach services can be attributed to recent urbanization and industrialization trends in the farming industry that dramatically changed the structure of the country's rural communities. The Census of Agriculture reports consistent trends of increasing average farm size and declining number of farms since its peak in 1935 (USDA) as a result of increasing trends in farm mechanization, business consolidation, and

production specialization/integration designed to increase business efficiency and competitiveness. The proliferation of larger farm businesses redefined the information needs of farmers in general. More sophisticated and specialized producers have either started relying more on private suppliers of information or explored alternative means to access public information (such as through the Internet and by direct contact with other Federal/State officials), in lieu of direct patronage of traditional outreach services offered by universities (Ilvento). Technological advancement has created opportunities for more convenient, swift and open access to information that previously was transmitted mostly through the university extension delivery system. Private consultants have capitalized on the latest innovations in information technology to gain more access to the extension clientele.

Redirection to the Golf Industry

Given the research agenda of land-grant universities normally attuned to the needs of the farming sector, the golf industry is a non-traditional industry that might be a potential beneficiary of any redirection of university extension services. While farming and golf industries have striking differences in structure, market orientation and operations, most of their informational needs are similar. Thus, the university's extension program traditionally designed to meet farmers' needs could be partially redirected, without revamping the program to service the needs of the golf industry.

For instance, the university's research efforts are currently geared towards the development of efficient and effective irrigation systems to quell the effects of prolonged drought that has affected Georgia for several years. Golf businesses, just like farms, also require assistance in irrigation management. Specifically, impending regulations by the Environmental Protection Division require golf courses to justify continued use of potable water for irrigation

4

instead of non-potable sources. The development of non-potable water sources requires new permits, compliance with possible restrictions, the identification of a water source, and the construction of infrastructure (delivery systems) to and within the golf facility. Maintaining environmental quality requires proper management of chemical applications, monitoring of weather conditions, and properly trained staff.

Pest risk management is another area of important concern for golf courses (McCarty). As in farming, pest risk management must consider seasonal variations (monthly or annual) in pest problems due to the cyclical nature of pest populations, changing weather patterns, and the availability of control measures. Moreover, as certain pesticides are banned by the Environmental Protection Agency due to their highly toxic nature, golf courses, just like farmers, will need effective and economical substitutes.

At the University of Georgia, the Turfgrass Program in the College of Agriculture and Environmental Sciences (CES) was created as an interdisciplinary effort of scientists working together in extension, research and teaching. The faculty members address the needs of all segments of the industry mainly through the departments of Crop and Soil Sciences, Plant Pathology, and Entomology. This team disseminates useful and practical information to the university's clientele through the local CES office in every county in the state. The university's turfgrass extension group is a nationally recognized program composed of an interdisciplinary team of seven scientists that engage in various educational activities. These scientists are experts in issues related to cultivar and germplasm development; crop management and physiology; weed management; turfgrass management; soil, fertility, water, and waste management; and insect/disease management education. In an average year, this team writes 15 articles for

national or regional industry publications and 75 articles for instate publications. Each year they also speak at about 200 meetings and are involved in over 50 field research demonstrations.

Ultimately, the redirection alternative could be envisioned to generate potential benefits for the public. This can be realized if free university extension services could significantly reduce maintenance costs, which translate to more affordable fees and, thus, greater access for the public to such a popular recreational activity. Moreover, taxpayers might be relieved to know that the university's involvement in pest-, water- and land-related concerns of golf courses could ensure the safe, responsible and efficient utilization of environmental resources.

The Georgia Golf Industry Profile

Florkowski and Landry reported that the number of golf courses had increased rapidly with the population growth in Georgia. From 1972 to 1998, the number of courses in Georgia increased 118 percent to 430. The National Golf Foundation (2001, 2002) ranked Georgia among the top 10 states in the country in new golf course development during the 1990s. The NGF also reported that the combination of natural population growth and favorable demographic changes should insure that the number of golfers and rounds played would continue to grow at rates of one to two percent annually.

Golf courses are developed and maintained under a significant range of budgets in Georgia. They also generate significant revenues and provide employment for various skill levels from manual laborers to golf superintendents, golf professionals, and club managers. Most new courses in Georgia have been developed in urban areas, with Atlanta being the area of highest growth. More than 71 percent of the courses surveyed by Florkowski and Landry spent more than $100,000 in annual course maintenance and almost 33 percent spent more than

$250,000. The average maintenance budget was more than \$417,000 in 1998, which is equivalent to an inflation-adjusted budget (using GDP deflator) of \$116,176 in 1970.

The industry could also be characterized as amiable to change. This is supported by the fact that the type of turfgrasses used on the courses has changed dramatically with the release of new cultivars. In 1970, 59 percent of the fairways were planted in "common" bermuda grass whereas only 5 percent used this grass in 1998. In 1970, only 11 percent used "Tifway," a new cultivar released by UGA. By 1998 it was used on 61 percent of fairways.

The state's golf industry is managed by relatively young superintendents (Florkowski and Landry). These are the individuals responsible for maintaining high quality playing surfaces under sound environmental management principles. This requires a sound background in science and the ability to manage and communicate effectively with employees, players, club members, and managers. In Georgia, the largest group of superintendents (37 percent) is between 30 and 39 years of age. This relatively "younger generation" of superintendents are more likely to be more innovative, easily assimilate changes and new ideas, and hence, accommodate more inputs (assistance) from university extension services.

Empirical Design

Data for empirical analysis were obtained from a survey conducted among members of the Georgia Golf Course Superintendents Association in 1999. Ten days after the postmarked date of mailed survey form, a post card was sent as a reminder for the completion and return of the questionnaire. A second copy of the questionnaire was later sent to those that did not respond after the reminder. Among the 352 individuals surveyed, an overall response rate of 62.5% after the two mailings was realized.

The respondents provided information on almost all qualitative questions on growth prospects and business management issues. However, a number of respondents did not respond adequately to quantitative type of questions, such as those requesting estimates of the golf company's maintenance expenditures. The values of certain financial variables considered in this study could not be determined due to these incomplete or missing responses. Hence, this study is based only on information provided by 115 survey respondents that answered completely both sets of qualitative and quantitative questions.

The Econometric Framework

A binomial logistic framework involving a dichotomous dependent variable is used to determine important linkages between the respondents' perception of the significance of the university outreach services and certain demographic, structural and financial characteristics of their golf course businesses. The estimating equation is defined as:

(1) $$Y = \text{logit}(p) = \log\left(\frac{p}{1-p}\right) = a + BX + e$$

where Y is the event of interest that takes on an ordered value of 1 if the event happens and 0 if otherwise; p is the probability of the event's occurrence, i.e., $P(Y=1)$; while a, B, X and e correspond to the intercept, the coefficient estimate(s), the explanatory variable(s) and the error term, respectively, which are the estimating equation's right-hand side components (Greene).

A backward elimination procedure, an optional method available under the logistic framework in SAS, was used to filter less important variables and retain only regressors with more significant impact on the dependent variable. The estimation technique starts with a general regression procedure that considers all eligible explanatory variables, which include a number of demographic and structural factors, financial ratios and qualitative variables. The model undergoes several iterations as variables that contribute the least to the model's

explanatory power are dropped one after another from the estimating equation until all remaining variables produce F statistics significant at a specified confidence limit

Significance Ratings for University Outreach Services

The dichotomous dependent variable is based on the ratings given by the superintendents on the significance of the University of Georgia's outreach research and education programs. The respondents provided their ratings using a Likert-type scale ranging from 1 (very unimportant) to 5 (very important). The 5-point scale ratings given by the respondents have been further re-classified into two categories to fit into this study's binomial logistic framework.

Two versions of such binary classification of responses were used in this study due to the dearth of observations in certain rating levels. In the first version, hereafter referred to as the Standard Classification, the dependent variable takes on an order of 1 for ratings of slight and high importance (4 and 5 in the scale, respectively). In this case, the binary classes create a distinction between perceptions of significance and insignificance of the university's outreach programs.

A second approach (hereafter referred to as the Modified Classification) assigns an ordered value of 1 to the dependent variable only in cases where the highest rating of 5 (very important) was given. The distinction, in this case, is between a rating of high significance versus low, zero and negative importance of the extension programs to the respondents.

This arbitrary division provides a clear distinction between those who perceive the land-grant system outreach as important or not important under the Standard Classification. The Modified Classification, on the other hand, provides insights about the group recognizing outreach activities as particularly important and, therefore, likely representing the core

supporters of the publicly funded system of dissemination of research results useful to maintenance and operation of golf course facilities in the state.

Determinants of Demand for University Outreach Services

The model's explanatory variables include six demographic and structural factors, three financial measures and five qualitative variables capturing the superintendents' views on their business growth prospects and the urgency of issues relating to four areas of operation. The following discussion provides a description of the individual variables.

Demographic and Structural Factors

Previous studies focusing on the farmer-clientele of the university's research and extension programs have identified important linkages between certain demographic and structural factors and the demand for such services. For example, among Canadian farmers in Ontario, younger, full-time farmers who operated larger farms had more frequent interactions with university specialists and extension agents (Lavis and Blackburn). Another study conducted by Ortmann, et al. among farmers in Illinois, Iowa, Indiana and the Southeastern region (primarily in Georgia) contends that more educated farmers operating large farms tend to exhibit higher demand for more specialized information, which could be directly and indirectly sourced from university research programs.

This study will determine the relevance of the same set of factors when applied to extension clients in the golf industry. The variables considered include the respondent's age (AGE), total number of years of school attendance (EDUCATION), total number of years of work in the golf industry (EXPERIENCE) and the property's size in acres (PROPSIZE).

Moreover, the age of the golf course (BUSAGE) and the number of full-time year-round employees (FTYRE) were also added to the model. Older businesses might require less

assistance from specialists given their much longer and richer cumulative industry experience. Golf facilities that employ more FTYRE are expected to be more dependent on external consultants, which could either be paid providers or publicly available outreach specialists. Thus, FTYRE is expected to directly affect the model's dependent variable.

Financial Factors

Three cost ratios were calculated from the estimates provided by the respondents. Values of these ratios will provide the turf managers' emphasis on certain priority areas of operations that could influence their perception of the importance of outreach services.

A golf company's emphasis on efficient and effective maintenance of turf areas can be discerned through the input ratio (INPUTRAT) variable, which is calculated as the ratio of costs of herbicides, fungicides, insecticides, growth regulators, wetting agents and other agronomic inputs to total maintenance costs. Higher ratios indicate larger relative expenditures on the listed chemical inputs. In recent years, however, there has been a trend toward developing new chemical formulations and modifying the application of existing chemicals in order to lower chemical costs and reduce any threat of runoff that could lead to pollution of surface water. It is plausible that golf facilities are more likely inclined to seek the services of external consultants, including university extension agents and specialists, in order to decrease utilization rates of certain chemicals that will effectively lower overall input costs. The hypothesized relationship between the input ratio and the expressed importance of outreach services is positive.

The propensity to expand the business is captured by NEWEXPRAT, which is calculated as the ratio of the cost incurred by ongoing expansion projects (renovation projects, acquisition of new equipment, and new construction) to estimated aggregated business expenditures. A prudent manager facing an expansion, associated with increased expenditures, naturally seeks

advice to assure the most effective way to spend the allocated funds. University outreach services, available free of charge, can provide information enhancing the optimal use of funds committed to expansion. Therefore, we expect a positive relationship between the new capital expenditures ratio and the dependent variable.

The third ratio, WATERAT, concentrates on water-related issues. The measure considers the ratio to total business expenses of the costs of water supply plus expenditures related to the maintenance and repair of irrigation equipment. It appears logical that golf courses coping with high water-related expenditures would value the free expertise of outreach services. The dependent variable is therefore expected to directly vary with WATERAT.

Qualitative Variables

A separate section of the survey was devoted to soliciting the superintendents' opinions on the urgency of problems/issues in certain areas of operation using Likert-type scales. The scale applied to the measurement of respondent perceptions of an issue ranged from 1 (very unimportant) to 5 (very important). In this analysis, the responses to twelve separate issues were grouped into four major categories. The regression procedures adopted a measurement approach that assigns an index value for each category. This value is the sum of the ratings given to the individual issues classified under a particular category.

The first category is represented by the variable LABORDEX, which is calculated as the sum of ratings given to three employment concerns: obtaining qualified seasonal labor, employee language barrier and overall personnel management. The need for skilled personnel is an important concern in the golf industry that uses specialized and relatively expensive equipment. However, the seasonal demand for workers with specialized skills complicates the search for suitable employees. Moreover, Larson cites that golf businesses usually contend with

high employee turnover rates, which, in 2000, was much higher than the Department of Labor's national employee turnover rate (Larson). She further clarifies that employee turnover can be very costly to the golf business when separation, replacement, training and intangible costs are all taken into consideration. The direction of the association between the index and the dependent variable is difficult to anticipate because of the variety of employment concerns. Although the outreach service can assist in training workers on proper agronomic techniques and equipment use, it may be of little assistance in other issues in employee management.

The second qualitative variable, WATERDEX, is the rating given to the urgency of water issues. Managing water resources is knowledge-intensive and a top priority in areas, like Georgia, that are more likely to experience prolonged drought conditions. It is therefore expected that the higher the level of concerns among superintendents, the more likely they are to perceive the outreach programs as a source of important information.

The third category is represented by PESTDEX, an index calculated as the sum of ratings for issues on federal/state regulations governing pesticide use, turf insects and pesticide safety. Pesticide costs remain one of the highest material expenses incurred by golf courses. Because extension specialists are involved in testing new chemicals and application methods, they are capable of providing relevant information to golf course superintendents. The expected relationship between the index and the dependent variable is positive.

The fourth index, TURFAGRODEX, covers issues in turf maintenance such as turf weeds, insects, diseases and turf agronomics. Issues in basic turf maintenance and agronomics are also influenced by weather and cost considerations. Examples of these concerns include seasonal variations of turf conditions throughout the year, restricted use of certain chemicals as regulated by federal authorities and cost efficiency issues. Given the university's reputation as a

leader in turf agronomic research, golf businesses are more likely to assign a greater value and priority to university extension services in this area, thus, justifying an expected positive effect of this variable on the demand for university outreach services.

In addition to these indexes, a fifth qualitative variable is introduced to capture the superintendents' qualitative projection of their company's growth (EXPGROWTH) during the year following the survey. This variable is based on a five-point Likert-type scale ranging from 1 (expecting a major downturn in business activities) to 5 (expecting a major/significant business growth). Growth expectations are an important variable, but their effect on the perception of the significance of university outreach services could not be easily determined. Consultation with external advisers, including university specialists and extension agents, could be important to golf businesses that undertake expansion plans and anticipate growth in the near future. However, external consultants may also be needed by golf facilities experiencing financial stress and are expecting a slowdown in business activity that could erode business revenues and profits. Given these arguments, the relationship between growth expectations and the dependent variable will be empirically determined in this study.

Descriptive Results

The mean values of all considered variables are presented in Table 1. The means were calculated under the two ordering schemes for ratings given to the importance of the university's educational outreach services. Based on the summary, the superintendents' years of work experience produced a noticeable difference in expressed opinions about the importance of outreach programs as a source of information. Superintendents with less experience were more likely to attach importance to the outreach programs as an information source under the Standard Order, but the difference was marginal under the Modified Order. However, golf businesses that

existed longer tended to provide higher marks for the extension services than those with a shorter

history of existence. The same trend applies to larger golf facilities in terms of turf area,

although the reverse is true when the other size measures (total property size and the number of

holes in a golf course) were considered.

The most striking differences, regardless of ordering type, were observed in the expressed

level of concern with issues related to water, pest, turf agronomic and labor management. Not

surprisingly, a high degree of concern with any of the four issues has been associated with high

ratings on the significance of the university's extension programs. Notably, the observed

urgency of water concerns does not match the trend in estimated water expenditure ratios that

have remained relatively constant across the binomial classes in both ordering approaches. The

same inconsistency applies to ratings of pest and turf agronomic concerns compared to the

observed mean input cost ratios across the binomial classes. The econometric framework will

verify the validity of these relationships deduced from a cursory mean value analysis.

Econometric Analysis

The binomial logistic regression results obtained under the standard and modified

ordering of values of the dependent variable are summarized in Table 2.   Since logit coefficient

estimates could merely be interpreted relative to the "log odds ratio" and do not provide any

direct reference to the rate of change in values of the dependent variable, the marginal effect of

each regressor was derived as:

$$(2) \qquad \frac{\partial \beta}{\partial p} = f(\beta X)\beta$$

where p is the probability of obtaining a high significance rating for university outreach services,

β is the logit coefficient and f(.) is the density function of the cumulative probability distribution

function (Greene). The marginal effect provides more intuitive information on the effect of each

unit change in the value of the variable on the probability of obtaining higher importance rating for university outreach programs.

The remaining variables in the abbreviated models under the two approaches that survived the backward elimination procedures have been tested for the presence of multicollinearity. Diagnostic tests performed in SAS yielded highest condition index numbers of 2.07 and 4.15 for models under the standard and modified ordering approaches, respectively. These statistics are far below the critical value of 20 established by Belsley (1991) to signify the presence of collinearity among variables.

Based on the results, the two ordering approaches emphasize different classes of significant variables. Under the standard ordering procedure that distinguishes ratings of importance and non-importance of extension programs, property size (PROPSIZE) and the respondents' work experience in the golf industry (EXPERIENCE) are significant variables. The negative marginal effect of PROPSIZE does not conform to previous empirical results on farmers' demand for extension services. This could suggest that the business growth in the golf industry follows a much steeper curve than farm businesses. Thus, golf firms that have grown larger could have acquired greater financial capability, relative to larger farms, to finance the procurement of information from more expensive sources outside the university outreach system.

The negative effect of EXPERIENCE on the binary dependent variable confirms a logical expectation that the less experienced superintendents in the industry have greater informational needs from external sources, especially through university outreach programs. These newer superintendents could easily identify the university as an information provider given its long history of outreach service, which has enhanced its reputation in the industry.

Moreover, GROWTH and PESTDEX are important concerns that significantly enhance the probability of high importance rating. Respondents with high expectations of business growth, especially among younger courses anticipating more growth for the "new" business, are more likely to attach a higher level of importance to the extension service information than those with low growth expectations. These newer businesses would be more inclined to patronize more of the inexpensive services offered by extension programs in order to achieve growth. On the other hand, more established courses are less likely to demand extension services due to accumulated business experience and, perhaps, diminishing desire to grow the business at a much faster pace.

The PESTDEX variable is the only variable that occurs in both the standard and modified ordering models. Both results suggest that golf courses with urgent pest issues are more likely to seek university experts' assistance. This underscores the critical impact of some pests on golf course success and the desire to maintain environmental quality and safety for applicators, players and the public. The marginal effects in both models are also very similar in magnitude.

The ratio to total expenditures of new cost outlays for expansion and renovation (NEWEXPRAT) has a positive effect on the dependent variable. Indirectly, NEWEXPRAT can be associated with the GROWTH variable, a significant positive factor in the standard ordering scheme. It can be argued that golf companies only incur large capital expenditures for new equipment purchases and expansion of facilities if they foresee significant business growth in the next few years. Capital outlays can be large on a golf course and it is prudent to contact and seek expert advice including extension specialists.

The input cost ratio (INPUTRAT) negatively affects the probability of obtaining high importance rating for university outreach programs. Higher input cost ratios could be attributed

to golf courses with more extensive pesticide, herbicide and other turf maintenance programs already in place. These larger investments could include allocations for hiring of the services of agronomic experts other than university specialists either through employment, external consultation or as a built-in service when purchasing pesticides. University extension specialists would not provide other information about the use of pesticides than those recommended by manufacturers. High dependence on pesticides may dampen golf courses' interest in information from the extension service about ways to change pesticide applications. Any change will require possible re-training and upgrading of the skills of chemical applicators that could lead to cost increases, while creating uncertainties on the effectiveness of alternative treatments.

The probability of obtaining a high demand rating for extension services is also directly influenced by water-related concerns (WATERDEX) of the respondents. Persistent drought conditions in Georgia have heightened the golf businesses' need for technical assistance from university experts on turfgrass management issues, design and maintenance of irrigation systems that may improve water use efficiency and eliminate pest problems associated with drought.

Employment-related concerns (LABORDEX) are positively influencing the dependent variable. This indicates that more pressing issues in labor management such as labor training could create a greater urgency to seek assistance from university specialists and extension agents. The direction of the relationship between the two variables was not readily anticipated because of the complexity of labor-related issues in operating a golf facility. It is likely that the quality of labor can be improved through the training offered by extension personnel in areas of turf care, equipment use, and irrigation. These issues require repeated attention as the spring maintenance chores intensify and the outreach programs also provide information for in-house training.

Concluding Remarks

This study demonstrates linkages between the demand for university outreach services and several structural, financial and qualitative variables obtained from a survey of golf course superintendents in Georgia. The investigation was undertaken in response to the continuing struggle to evaluate the position of publicly funded outreach programs as a source of information for various clientele groups. The increasing relevance of turf and ornamental crops in providing recreation services such as golfing creates a new segment of information users and this study is the first attempt to identify its assessment of the extension service as information provider.

The probability of obtaining an average to high importance rating for university extension programs increases among smaller golf courses and facilities managed by more experienced superintendents. Small facilities likely cope with narrower profit margins and free information obtained from the extension service can improve their economic performance through enhanced efficiency of input use or lower costs of renovation and expansion projects. Concerns about pesticide use and business growth expectations are among the significant issues that could determine the above average demand for university outreach programs.

In a modified distinction of significance ratings, pesticide concerns and increased capital expenditures that could signal growth remain significant determinants of such demand indicator, in addition to more pressing concerns on employment and water issues. On the other hand, golf courses with higher INPUTRAT values, likely reflecting well-established internal agronomic and pesticide management programs, tend to demand less of university extension services.

This study demonstrated a potential market niche for outreach programs of the university within an alternative clientele group in the state's golf industry. The respondents' perceptions

suggest the need for continuing relevance of university extension services to pressing issues experienced by golf businesses in the state.

A redirection of extension efforts towards a new clientele group, such as the golf industry, is a significant response to the challenge faced by land grant institutions to reduce existing gaps in their research and extension programs. As McDowell notes, land grant universities are usually criticized for engaging in most research endeavors that cater more to the objectives of scholarly societies, rather than responding to its "social contract of public service." Ilvento presents corroborating evidence from the National Research Council (NRC) in the 1990s showing that only about 16% of experiment station staff conducts research in areas being addressed by at least half of the university extension personnel.

This study suggests that such disparity in research and extension objectives could be minimized given the observed congruence between the information needs of golf businesses in the state and the expertise and existing research portfolios of UGA's specialists in plant pathology, crop and soil sciences and entomology. This clientele diversification strategy promises to be a worthwhile, productive and enriching undertaking at this time when the traditional farm clientele is still redefining its information needs and university research programs are re-evaluating its priorities to better serve a wider range of extension audiences. Further research efforts should address issues related to the effective marketing of these university services to newer clients, like the golf industry. At this juncture, land grant institutions elsewhere in the country need to be increasingly perceptive of and responsive to such opportunities for diversification of extension clients in order for public outreach efforts to thrive in years to come.

References

Belsley, L. *Conditioning Diagnostics: Collinearity and Weak Data in Regression.* New York: John Wiley and Sons, 1991.

Florkowski, W.J. and G. Landry. *An Economic Profile of Golf Courses in Georgia: Course and Landscape Maintenance.* The Georgia Agricultural Experiment Stations. College of Agricultural and Environmental Sciences, The University of Georgia. Research Report No. 681. April 2002.

Ford, S.A. and E.M. Baab. "Farmer Sources and Uses of Information." *Agribusiness* 5-5(1989):465-76.

Greene, W. *Econometric Analysis,* 3rd ed. Prentice Hall, Englewood Cliffs, N. J., 1993.

Ilvento, T.W. "Expanding the Role and Function of the Cooperative Extension System in the University Setting." *Agricultural and Resource Economics Review* 26-2(October 1997):153-65.

King, D.A. and M.D. Boehlje. "Extension: On the Brink of Extinction or Distinction?" *Journal of Extension* 38-5(October 2000); internet address: http://www.joe.org/joe/ 2000august /comm1. html.

Larson, L. "Employee Turnover: Are They Really a Dime a Dozen?" *USGA Green Section Record* (September/October 2002). Internet address: http://www.usga.org/green/ ARCHIVE/ Record/02/sept-oct/employee.html.

Lavis, K.R. and D.J. Blackburn. "Extension Clientele Satisfaction." *Journal of Extension* 28-1(Spring 1990): 28,36.

Mawby, R.G. and C.B. Haver. "Types and Sources of Information Used By Farmers," in *Managerial Processes of Midwestern Farmers*, G. L. Johnson, A. N. Halter, H. D. Jensen and D. W. Thomas, eds., Iowa State University Press, Ames, IO, 1961, pp. 24-40.

McCarty, L.B. *Best Golf Course Management Practices.* Prentice Hall, Upper Saddle River, New Jersey, 2001.

McDowell, G. R. *Land-Grant Universities and Extension into the 21st Century: Renegotiating or Abandoning a Social Contract*. Iowa State University Press, Ames, IA, 2001.

National Golf Foundation. 2001. *Golf Facilities in the U. S.: 2000 Edition.* Internet address: http://www.ngf.org.

National Golf Foundation. 2002. *Golf Facilities in the U. S.: 2001 Edition.* Internet address: http://www.ngf.org.

Ortmann, G.F., G.F. Patrick, W.N. Musser, and D.H. Doster. "Use of Private Consultants and Other Sources of Information by Large Cornbelt Farmers." *Agribusiness* 9-4(1993):391-402.

U.S. Department of Agriculture. *1997 Census of Agriculture,* Volume 1:Geographic Area

Series, Part 51: United States Summary and State Data. AC97-A-51. March 1999.

Table 1. Means of dependent and explanatory variables, standard and modified classification of binomial dependent variable

| Variable | Standard Order | | Modified Order | | |
	Class 1 (Lower Significance)	Class 2 (Higher Significance)	Class 1 (Lower Significance)	Class 2 (Higher Significance)	All Observations
Respondents	20	95	52	63	115
AGE[1]	39.65	40.39	39.23	41.11	40.26
EDUCATION[2]	13.80	14.41	14.60	14.06	14.30
EXPERIENCE[3]	17.73	15.53	15.82	15.98	15.91
PROPSIZE[4]	225.00	180.57	199.75	178.84	188.30
BUSAGE[5]	26.75	34.11	29.44	35.62	32.83
FTYRE[6]	10.80	9.25	9.73	9.35	9.52
INPUTRAT[7]	0.20	0.22	0.27	0.17	0.22
NEWEXPRAT[8]	0.32	0.31	0.29	0.33	0.31
WATERAT[9]	0.03	0.03	0.02	0.03	0.03
LABORDEX[10]	8.25	12.41	10.27	12.86	11.69
WATERDEX[11]	2.55	4.76	3.75	4.89	4.37
PESTDEX[12]	13.05	22.85	18.33	23.48	21.15
TURFAGRODEX[13]	8.20	13.74	11.00	14.24	12.77
EXPGROWTH[14]	3.80	3.96	3.94	3.92	3.93

Notes: [1]Respondent's age in years;

[2]Total number of years of school attendance;

[3]Total number of years of work in golf industry;

[4]Area of business property in acres;

[5]Age of golf course in years;

[6]Number of full-time year-round employees;

[7]Ratio of costs of herbicides, fungicides, insecticides, growth regulators, wetting agents and other agronomic costs to total maintenance costs;

[8]Ratio of new capital expenditures to total maintenance costs;

[9]Ratio of water-related expenditures to total maintenance costs;

[10]Sum of ratings given to overall personnel management, labor seasonality and employee language barrier;

[11]Rating given to urgency of water-related issues;

[12]Sum of ratings for pesticide concerns, federal/state regulations, turf insects and pesticide safety;

[13]Sum of ratings for turf weeds, turf diseases and turf agronomics;

[14]Respondent's perception of growth prospects for the following year.

Table 2. Binary logistic regression results under backward elimination procedure, standard and modified classification of the binary dependent variable

Variables	Modified Order			Standard Order		
	Parameter Estimate	Standard Errors	Marginal Effect (%)	Parameter Estimate	Standard Errors	Marginal Effect (%)
Intercept	-16.1758***	3.8557		-10.8148***	3.7163	
AGE				0.1019	0.0731	0.0092
EXPERIENCE				-0.1576*	0.0828	-0.0142
PROPSIZE				-0.00630**	0.00309	-0.0006
FTYRE				0.1006	0.0647	0.0091
INPUTRAT	-1.7100*	0.9553	-0.1539			
NEWEXPRAT	1.6596*	0.9886	0.1494			
LABORDEX	0.2679**	0.1277	0.0241			
WATERDEX	1.0211**	0.4564	0.0919			
PESTDEX	0.3697***	0.1164	0.0333	0.4262***	0.0987	0.0384
EXPGROWTH				0.7946*	0.4162	0.0715
Likelihood Ratio (-2 Log L)		103.985***			50.980***	
Score Statistic		34.1624***			59.0323***	

Note: Asterisks denote significance at 90% (*), 95% (**) and 99% (***) confidence levels.