Establishing the Economic Impact Of the Green Industry on Louisiana's Economy

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Selected paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Mobile, Alabama, February 1-5, 2003

Introduction

Gardening and lawn care activities provide many benefits - the opportunity to enjoy leisure time, to make homes more attractive and valuable, and, for many people, to reduce the stress from the work world. The industry that provides plant material and services has shown consistent growth over the years. This growth is driven by an increasing population and disposable income. These products are considered luxury items, and increased expenditures during economic growth are expected because families and individuals have more disposable income. In addition, the private sector's excellent overall performance over the past decade, leading to increased investment in buildings and facilities, has encouraged green industry purchases. Government at all levels has felt the benefit of increased economic activity, and construction in that sector expanded. Landscape installation and maintenance are part of investments by both the private and public sectors. These factors have contributed to the strong growth rates of purchases of green industry goods. Even in slow economic growth periods, sales associated with these activities have remained relatively strong. As a result, the green industry has become an increasingly important component of the agricultural sector. This is particularly evident as the 'baby boomer' demographic has entered a phase in which it is interested in home improvement activities like gardening, and is devoting resources to those activities. Boomer households, like many others, have changed their lifestyles and consumption patterns in ways that are favorable to the green industry. These changes include spending more time at home doing "in-house" activities - projects where they spend more on products used at home rather than on outside activities.

Lawn and garden retail sales grew at a compound annual growth rate of 12.8% from 1996 to 2000. Of the 106.5 million households in the US, 85 million were involved in outdoor or indoor activities related to lawn and garden activities. As examples of annual expenditures per household on

lawn and garden products and services, the level increased from $353 in 1996, to $532 in 1999, and to $444 in 2001, for an annual rate of 4.6% from 1996 to 2001 (NGA, 2001).

The green industry is linked closely to other sectors of the economy. These relationships have evolved and transformed over time. Examples of those changing relationships are new ways to contact customers through automated systems, interactive networks, or web sites, and improved contacts between suppliers and producers. Mass merchandisers are very important at retail, and have helped to broaden the market. The landscape service sector provides customers access to more diverse services.

For these and other reasons, researchers and others have been interested in measuring the contribution of the green industry to the overall economy. In Louisiana, Hughes and Hinson (1997) estimated this impact using an input/output framework and the IMPLAN model. With growth and change in the economy, the input data and the results quickly become outdated.

Other states are interested in these value questions. A literature review identified similar studies that have been conducted in the United States in recent years. Leones and Ralph (1995) estimated the contributions of the green industry in Arizona in 1994. That study was updated by Payne in 1999. Results showed that full time equivalent jobs had increased to 20,548 (56% increase), payroll had increased by $130 million and total sales increased by $285 million (43%). Additionally the green industry in Arizona had exports to other countries and other states of $53.2 million, showing the capability of this industry to bring additional money into the local economy. Similar studies using IMPLAN have been conducted in Texas (Hall and Jupe, 2001) Illinois (Campbell at al., 2000), South Carolina (Rathwell et al., 2001) and Florida (Hodges and Haydu, 1999) among others.

The objective of this study was to update and improve the green industry impact study from

1995. To provide better estimates, procedures were implemented to improve data collection. Sales information was needed for producers of ornamental plants and sod, for the landscape design installation, maintenance (LDIM) area, and for golf courses. In addition, there are many areas of economic activity whose main line of work is not the green industry, but where there is significant activity relevant to the green industry. Landscape maintenance at churches and at public schools are examples. These institutions provide regular maintenance to substantial areas, and an important market and linkage to the industry. Overall, the list of these kinds of institutions includes:

- churches and cemeteries
- public elementary and secondary schools - 65 districts
- public colleges and universities - 3 systems
- private schools, elementary, secondary and college/university
- parish/city grounds, parks and playgrounds
- state parks and recreational areas
- road shoulder and median maintenance
- airports
- construction industries
- real estate

In addition, consumer retail expenditure on nursery industry products was estimated.

Methodology

An input-output model (IMPLAN) was chosen to calculate impacts. To improve data quality, surveys were conducted to verify or update the IMPLAN data set. Surveys were sent to groups that represented the major consumers or producers of green goods and services, identified above. Listings

from different sources were obtained. Dillman's methodology was modified to fit the circumstances of the study, and followed. From the producer, LDIM, and golf courses, the survey instrument included questions on revenue and expenditure in sufficient detail to assess the validity of the production function information in IMPLAN. That information included wages and salary expenses from employees, and expenditures on inputs such as plant material, chemicals and fertilizers, fuels and other types of materials. For other sectors where 'expenditures only' were relevant, the areas of economic activity identified above were surveyed. Road shoulder and median maintenance expenditures were provided by the state's transportation department. Expenditures in the construction and real estate industries were estimated from IMPLAN data sets.

The instrument used in the survey of each individual group was tailored for that group. The packet of material mailed contained appropriate cover letters explaining the purpose and importance of the study, and the importance of response by individuals and/or companies. Additionally, letters of support from the Louisiana Nursery and Landscape Association (LNLA) and the Louisiana Turfgrass Association were included in the mailing package. All survey instruments were based on those used either in the 1996 Louisiana study, or on instruments found in relevant literature. All instruments were pretested appropriately.

Nursery Producers. A list of nursery producers was obtained from the Louisiana Department of Agriculture and Forestry (LDAF). The target population was commercial nursery operations. A list was created by deleting any operation with less than 1 acre in field production, less than 0.5 acres in production container, or less than 0.04 acres in greenhouse production. In addition, a list of type 1 licenses had been used in past surveys. Growers who did not meet the size criteria had been identified, and were removed. Some respondents had identified themselves previously as small retailers only, and

were removed. These actions reduced the list size to 401. After the mailing procedure, some responses were received from individuals and/or companies who indicated that they were not part of the target population for similar reasons. Removing these responses placed the target population to 352. In addition, special attention was given to the getting responses from the ten largest nursery growers.

Landscape Design, Installation and Maintenance. The development of the survey instrument was similar to that described for producers, and a questionnaire used by Leones and Ralph was identified as appropriate for modification. As with producers, the objective was to collect information from commercial firms. Lists of LDIM firms with addresses in Louisiana were obtained from LDAF and the American Business Directory (ABD) The list provided by the LDAF contained the businesses that possess commercial license type 1. The LDAF list contained 4,183 names. There were many duplicates, and their removal reduced the list to 2,565 names. Because there was little useful information in the data set on which to base stratification, 300 names from this list were selected randomly.

ABD, a private organization, provides a broad set of information about businesses classified by business type, employee number, and sales. The ABD list contained 938 names of companies/business. A random sample of 500, stratified by sales category, was taken from this list.

Golf Courses. A questionnaire by Barkley et al. (1994) was modified to collect appropriate information on kind and size of course, revenues, expenses and employment in Louisiana. A list from ABD contained 129 names of golf courses. Returned mail and wrong addresses reduced the population. These addresses could not be corrected, so the final list contained 104 golf courses.

Other Sectors. Collection of expenditures in the other areas of activity used a common instrument. It was a single page, easy to complete document covering expenditures by major categories, acreage, and employment information on maintenance activities associated with grounds maintenance.

Survey Response Rates

Information about the original lists, target populations, samples used for the first mail/reminder postcards and the second mail and the numbers of surveys received from each group, is provided (table 1). In some cases, the original list differed from the target population because some of the names in those lists did not meet the requirement for that specific group.

Information on response rates is presented as follows, using the first line or growers as an example. The first mailing list for nursery growers was 352, as discussed above. Returned forms were checked for completeness. From table 1, the 5th column is the number of respondents in each group, the 6th is the number of completed, useful forms, and the 7th column presents the calculation of response rates for each group. Some of the most common reasons for excluding responses from the data set were that the response was incomplete, blank, involved in other kinds of activities with no relation to the green industry, no longer in business, or in case of nursery and sod producers, they had sales below $5000.

Updating IMPLAN's Industry Outputs and Expenditures

The following industries were chosen to be modeled individually:

- the grower and service sectors
- golf
- retail
- a combined model for industries with significant green industry links, identified earlier
- total impact

Using information collected from the surveys, the IMPLAN data set, local data sets, and the

National Gardening Association annual survey, model values for the chosen sectors were reviewed (table 2). As indicated, previous work and industry experts suggested the IMPLAN output estimate was low. Alternative estimates from previous work were considered, but rejected because they were believed to be biased upward. The choice was an estimate from the La. Extension Service, which represented a modest increase in value from the previous impact study. For LDIM, the survey response rate was low, providing little confidence in an estimate that might be projected from the procedure. There were no other local estimates of value, so the IMPLAN value was accepted. For golf, again the survey response rate was low. The National Golf Foundation surveys courses periodically for revenues and expenditures, and the output value from that source was used.

Economic activity in the related industries or sectors was estimated through a combination of the survey based reported of expenditures or from the IMPLAN database. For the survey-based impacts group (table 2 - churches and cemeteries, airports, parish/city grounds and parks, public school district grounds, state parks and recreational areas, and universities), information from the surveys was expanded to estimate state-level output values. These were stratified as much as possible. As examples, expenditures by primary and secondary school systems were considered as a group of 2 large population parishes, 8 smaller but regionally important parishes, and the remaining smaller parishes, and expenditures were accumulated appropriately. For that purpose, our surveys provided an estimate of the total expenditures on wages and salaries by

As an example, the total expenditures on grounds maintenance by churches and cemeteries were calculated using information collected from the survey. The proportion of churches only, cemeteries only, and church/cemetery combinations were estimated. Those proportion were 23%, 54% and 23%, respectively. Then, average expenditures per acre maintained was calculated by dividing the total

expenditures by the number of acres for each group. Finally, the proportion for each group was multiplied by the average grounds maintenance expenditure per acre for each of the groups: churches $2,186, cemeteries $3,446 and both (church and cemetery) $1,364. As an example, the 23% of respondents that were churches were multiplied by the total population (11,213) to obtain the proportion of 'churches only', or 2,579. That number was multiplied by the average cost per acre ($2,186) to obtain the total amount of grounds maintenance expenditures for churches ($5.6 million). A similar procedure was followed for the groups 'churches and cemeteries' and 'cemeteries only'.

The industries under the heading IMPLAN -based estimates (table 2) are distinct industries in the IMPLAN structure. These industries include construction and real estate, and have expenditures that are green industry related, and should be but are not credited to the green industry. For these industries, industry output is multiplied by the appropriate portion of that industry. These were identified by occupations within that industry. Largest among these was the 'Production, Construction, Operating, Maintenance, and Material Handling Occupations', some administrative support expenses under 'Clerical and Administrative Support Occupations', and several other occupational categories with small proportions of expenditures that could be identified.

Finally, the 'Retail' sector is included in the model. These expenditures occur in many kinds of retail stores, but mainly in nursery/garden center stores and in home-oriented mass merchandiser retailers. In reports of retail activity, the green industry sales often are intermingled with other categories of sales, so determining the portion that is relevant is difficult. Therefore, the NGA study was used. Estimates of per household retail purchases were multiplied by the number of households in Louisiana to get total sales. To avoid double counting, the spending estimate was multiplied by the retail margin of 48% to get the value in table 2. For florists, the sales value in Louisiana was available, and was reduced

by the retail margin to get the value used in modeling.

Results

An output multiplier table (Table 3) was obtained using IMPLAN model for major sectors in Louisiana. Final demands drives input-output models and industries respond to meet those demands directly or indirectly. Each industry that produces goods and services generates demands for other good and services and so on, round by round. Multipliers describe those interactions (IMPLAN Professional, 2000). Multipliers are presented in per unit ($) basis and reflect the total change in economic activity across all industries for a given change in activity for a particular industry (Hughes and Hinson, 1997).

Table 3 presents three different types of multipliers. The total multiplier is the sum of direct, indirect and induced effects. The type I multiplier measures the direct and indirect effects of a change in economic activity, and it captures the inter-industry effects (industries buying from local industries). The type II multiplier captures the direct and indirect effect, but it also includes the income and expenditures of households (induced effect).

The type II multiplier for greenhouse and nursery products was estimated at 1.607623. That means that a one dollar increase in output (sales) by that industry will result in a $1.607623 increase in total of economic activity (direct, indirect and induced effect). Total economic activity when induced effect is not taken into account (Type I Multiplier) was estimated at 1.206440. The type I multiplier for landscape and horticultural services was estimated at 1.253956, while the Type II multiplier was estimated at 1.640371.

Economic impact is an assessment in change of overall economic activity as a result of some change in one or several economic activities. This study presents results for economic impact for individual sectors, specifically production, retail and golf. In addition, an overall economic impact of all

sectors was conducted to measure the overall economic impact of the green industry on Louisiana's economy. Tables indicate the impact in gross sales (industry output), total personal income, gross state product and employment. Gross sales are a single number in millions of dollars for each industry, representing the value of an industry's total production. Personal income is the increase of income as a result of economic activity. Gross state product is composed by four components: employment compensation, proprietorship income, other proprietary type income and indirect business taxes. Employment is listed as a single number of jobs for each industry

The Production Sector. Table 4 shows the impact of the producer sectors (greenhouse and nursery production/ landscape and horticultural services) of the industry on Louisiana's economy. Total economic impact (gross sales) of the production sector was estimated at $604.94 million.

The total economic impact on personal income, gross state product and employment at $246.14 million, $385.49 million, and 15,160 jobs, respectively. Total gross sales by greenhouse and nursery producers were estimated at $119.86 million and total impacts on personal income, gross state product and employment were estimated at $55.74 million, $87.32 million and 2,823 jobs, respectively.

Economic impact results are reported under fifteen aggregated topics, using an IMPLAN procedure to aggregate industries by SIC one digit codes.

The Retail Sector. Retail sector analysis included two components: total expenditures by household in Louisiana in 2001 ($326 million) and expenditures on the florist sector ($42 million) totaling $368 million. Total impact of the retail sector on gross sales was estimated at $557.16 million (Table 5). The biggest impact was in the Trade sector with $398.32 million which includes wholesale trade, general merchandise stores, miscellaneous retail, food stores and building material, gardening, and others. The Trade sector was followed by Services with $62.59 million. Total employment generated by the retail

sector was estimated at 14,218.

The Golf Sector. The golf industry had an overall impact on gross sales of $202.43 million in 2001 (Table 6). Total Personal Income, Gross State Product, and Employment were estimated at $86.83 million, $122.14 million and 4,018 jobs, respectively. Sectors with the biggest impact by the golf industry were Other at $151.48 million which includes sales by golf courses, the Service Sector at $16.25 million, and Trade and Finance, Insurance and Real Estate (FIRE) with $11.28 and $11.08 million, respectively.

Overall Economic Impact. The estimation of the total economic impact of the green industry on Louisiana's economy indicates the overall contribution of this industry to the state economy. This is the total contribution by the production sector, wholesale and retail levels including golf courses and other industry activities performed by other sectors of the economy .

Results of the overall economic impact are presented (Table 7). Total economic impact of the green industry was estimated at $2.03 billion, Total personal Income was $852.29 million, Gross State Product was $1.41 billion and employment at 47,776 jobs. Also, sectors with the biggest impact were Greenhouse and Nursery Producers at $119.86 million, Landscape and Horticultural Services $266.12 million, Construction $286.02 million, Trade $507.92 million, FIRE $330.75 million, Services $237.22 million and Other $102.28 million.

The largest impacts on total personal income were in Trade, Services, Construction, Other, and Landscape and Horticulture Services at $245.00 million, $121.04 million, $113.42 million, $112.00 and $110.52 million, respectively.

Of the $1.41 billion in Gross State Product, the Trade sector accounted for $409.46 million, FIRE $233.70 million, Other $167.43 million, Landscape and Horticultural Services $166.93 million.

The sectors that contributed most to job generation in Louisiana's economy were Trade, Landscape and Horticultural Services, Others, Services and Construction with 4,814 jobs, 9,360 jobs, 9,529 jobs, 4,364 jobs and 3,306 jobs, respectively.

Conclusions

This study estimated individual and overall economic impact of sectors of the green industry on Louisiana's economy, and that impact is very substantial. In addition, the increase impact since the 1995 study is large, though part of that increase is accounted for by the areas of economic activity that were added. Compared with previous results from the model based on 1995, increases can be identified in total sales (an increase by 55.56% or $727.23 million), Total Personal Income (an increase of 396.32 or 86.91%), Gross State Product (an increase of $765.15 million or 117.96%), and Employment (an impact of 21,550 jobs or 82.17%).

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Table 1. Target Population List and Survey Response Rate for Selected Sub-sector in the Green Industry.

Sub-sector	1	2	3	4	5	6	7
Nursery and sod producers	541	401	352	332	63	50	17.89
Landscaping design, installation and maintenance	5,121	3,503	792	772	52	43	7.70
Golf courses	129	104	104	98	13	13	12.50
Churches and cemeteries	11,576	11,213	676	609	116	107	17.15
Schools, public elementary and secondary	65	65	65	55	13	13	20.0
Colleges/universities, public	16	16	16	14	9	9	56.25
Schools, private, elementary through colleges/universities	236	236	236	224	24	22	10.16
Parish grounds, parks and playgrounds	64	64	64	56	13	13	20.31
State parks	34	34	34	6	28	28	82.35
Airports	72	72	27	24	9	9	29.62

1= Original listing 2=Target population 3= First mail/reminder postcards 4= Second mail 5=number of responses 6=completed responses 7=response return percentage

Table 2. Industry Values for Sectors in the Green Industry, Louisiana, 2001.

Sector		Total Value ($)
Nursery producers[2]		119,942,946
Landscape design, installation and maintenance[1]		266,000,000
Golf courses[5]		151,337,200
Survey-based impacts		
Churches and cemeteries[4]		30,032,465
Public schools (schools districts) [4]		6,676,128
Public colleges and universities [4]		3,817,964
Private schools (all levels) [4]		8,657,656
Parish/city grounds, parks and playgrounds [4]		39,184,248
State parks [4]		571,046
Roads shoulder and median maintenance [4]		11,424,630
Airports [4]		490,485
	subtotal	100,854,622
IMPLAN-based impacts [1]		
New residential structures (sector 48)		20,801,210
New industrial and commercial buildings (sector 49)		41,085,626
New utility structures (sector 50)		27,755,148
New government facilities (sector 54)		70,800,344
Maintenance and repair other facilities (sector 56)		85,702,667
	subtotal	246,144,998
Real estate [1]		177,834,100
Retail		
Household expenditures [3]		326,000,000
Florists [1]		42,000,000
	subtotal	368,000,000

1 = IMPLAN; 2 = Louisiana Summary 2001; 3 = National Gardening Association Survey 2001;
4 = surveys

Table 3. Output Multiplier Table for Major Sectors in Louisiana Economy, 2001.

Industry	Type I multiplier	Type II multiplier
Greenhouse and nursery products	1.206440	1.607326
Agricultural, forestry, fishery services	1.268973	1.728757
Landscape and horticultural services	1.253956	1.640371
Mining	1.639390	1.847385
Construction	1.428036	1.674497
Manufacturing	1.466512	1.626708
Agricultural chemicals	1.373946	1.640379
Petroleum products	1.411349	1.549464
Farm machinery and equipment	1.300469	1.560600
Transportation, communications and utilities	1.329229	1.724066
Trade	1.195508	1.558602
Finance, insurance and real estate	1.198710	1.418972
Services	1.244880	1.618952
Government	3.164562	4.427908

Table 4. Impact of the Production Sector of the Green Industry on Louisiana's Economy as Estimated with the Louisiana Input-output Model, 2001.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employ-ment
		----------Dollars----------		
Greenhouse and nursery products	119,867,104	55,742,368	87,322,888	2,823.60
Agricultural, forestry, fishery services	2,146,343	1,130,860	1,397,802	86.8
Landscape and horticultural services	266,146,672	110,530,992	165,950,064	9,360.80
Mining	2,994,975	725,973	1,996,245	11.5
Construction	10,301,429	4,940,446	5,203,656	151.6
Manufacturing	20,667,366	3,152,792	5,251,083	76.6
Agricultural chemicals	530,817	130,252	288,773	1.2
Petroleum products	47,559	4,240	25,550	0.1
Farm machinery and equipment	167,184	40,992	58,316	1.1
Transportation, communication and utilities	28,927,940	7,806,907	16,355,927	189.3
Trade	41,046,992	18,224,594	30,116,782	893.2
Finance, insurance and real estate	41,939,348	7,989,165	28,717,302	295.9
Services	64,287,504	33,688,532	40,145,504	1,168.70
Government	4,240,276	1,316,054	1,803,357	31.3
Other	413,410	413,410	413,410	47.6
Total	604,943,893	246,141,840	385,498,340	15,160.50

Table 5. Impact of the Retail Sector of the green industry on Louisiana economy as estimated with the Louisiana input-output model

Industry	Gross Sales	Total Personal Income	Gross State Product	Employ-ment
	----------Dollars----------			
Greenhouse and nursery products	108,923	50,653	79,350	2.6
Agricultural, forestry, fishery services	60,395	31,821	39,332	2.4
Landscape and horticultural services	380,142	157,873	237,029	13.4
Mining	1,684,385	409,573	1,122,124	6.4
Construction	7,009,990	3,069,931	3,225,498	95.3
Manufacturing	15,697,934	2,857,642	4,402,960	84.9
Agricultural chemicals	32,003	7,853	17,410	0.1
Petroleum products	26,685	2,379	14,336	0
Farm machinery and equipment	5,884	1,443	2,052	0
Transportation, communications and utilities	23,756,668	6,118,750	13,354,347	138.2
Trade	398,321,024	195,689,312	327,842,496	12,339.20
Finance, insurance and real estate	41,731,348	6,882,664	29,141,626	250.9
Services	62,597,512	32,103,962	38,160,108	1,187.60
Government	4,391,562	1,529,228	1,982,756	34.7
Other	419,163	419,163	419,163	48.3
Total	557,164,552	249,567,149	420,368,202	14,218.20

Table 6. Impact of the Golf Courses Industry on Louisiana Economy as Estimated with the Louisiana Input-output Model, 2001.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employ-ment
	----------Dollars---------			
Greenhouse and nursery products	34,614	16,097	25,216	0.8
Agricultural, forestry, fishery services	20,811	10,965	13,553	0.8
Landscape and horticultural services	71,252	29,591	44,427	2.5
Mining	458,499	111,393	305,540	1.8
Construction	1,421,031	545,563	574,078	17.2
Manufacturing	3,960,072	608,957	1,000,829	18
Agricultural chemicals	10,761	2,640	5,854	0
Petroleum products	7,621	679	4,094	0
Farm machinery and equipment	1,620	397	565	0
Transportation, communications and utilities	4,979,890	1,251,585	2,849,917	29.2
Trade	11,284,861	5,105,952	8,367,127	276.8
Finance, insurance and real estate	11,087,212	1,679,083	7,823,735	57.6
Services	16,250,359	8,623,408	10,066,193	310.5
Government	1,036,675	299,095	422,875	7.4
Other	151,483,040	68,464,928	90,527,960	3,290.80
Total	202,432,607	86,831,356	122,144,833	4,018.40

Table 7. Impact of the Entire Green Industry on Louisiana Economy as Estimated with the Louisiana Input-output Model, 2001.

Industry	Gross Sales	Total Personal Income	Gross State Product	Employ-ment
		----------Dollars----------		
Greenhouse and nursery products	119,867,104	55,742,368	87,322,888	2,823.6
Agricultural, forestry, fishery services	2,146,343	1,130,860	1,397,802	86.8
Landscape and horticultural services	266,126,192	110,522,480	165,937,312	9,360.0
Mining	7,196,618	1,750,116	4,796,231	27.6
Construction	286,021,536	113,427,856	123,948,016	3,306.1
Manufacturing	67,654,016	11,680,088	18,501,066	323.9
Agricultural chemicals	615,618	151,061	334,906	1.4
Petroleum products	115,170	10,268	61,873	0.2
Farm machinery and equipment	184,365	45,205	64,309	1.2
Transportation, communications and utilities	88,885,624	23,435,306	49,442,040	562.1
Trade	507,925,408	245,001,488	409,468,256	14,814.20
Finance, insurance and real estate	330,755,456	50,396,696	233,700,736	2,393.3
Services	237,225,824	121,040,752	143,369,600	4,364.6
Government	14,730,838	4,870,247	6,468,925	113.3
Other	102,286,096	112,001,160	167,439,504	9,529.0
Total	2,035,688,443	852,291,391	1,413,812,292	47,776.9