Regional Structural Change in Production and Marketing Practices for the Nursery and Greenhouse Industry: 1988–2003[1]

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Abstract

The U.S. nursery and greenhouse industry has undergone major changes to production and marketing practices from 1988 to 2003. Using data from national surveys that have been partially funded by HRI, we examine the regional structural changes that have occurred during this period with emphasis on sales, advertising expenditures, and computer usage. Results indicate that a structural shift has occurred for several management decisions, with other decisions experiencing only regional shifts. Key results are that marketing and advertising expenses comprise an increasing percent of total sales, with advertising mediums experiencing varying levels of change. Transaction methods have experienced various types of changes with more in-person sales in the Northern region, less in-person sales in the Southern region, and no changes for the Western region. In contrast, telephone orders have decreased in the Northern region and increased in the Southern region, while all regions experienced lower trade show sales. There has also been a move away from wholesale toward retail sales, with repeat customers continuing to represent a large share of sales. Computer usage, as expected, has experienced a considerable increase due to every-day task usage.

Index words: green industry, greenhouse, marketing practices, nursery, structural change.

Significance to the Nursery Industry

Over the past two decades, there have been shifts in the structure, conduct, and performance of the nursery and greenhouse industry. Surveys have examined the present climate, but little has been done to understand what types of changes are taking place and whether or not the changes are regional in nature. Understanding the types of structural changes taking place and if they are localized allows both nurseries and greenhouses to better evaluate their managerial business decisions as compared to industry trends.

Introduction

The rapidly growing U.S. nursery and greenhouse industry (otherwise known as the 'green' industry) comprises an important part of the agricultural sector of the United States. Aggregate information detailing the size and scope of the U.S. nursery industry reveals that annual nursery crop sales have grown at an annual rate of 6.3% from 1989 to 2007, increasing from $7.8 billion in 1989 to $17.2 billion in 2007 (11, 13), with greenhouse and nursery crops accounting for the sixth largest value of farm cash receipts in 2007 (13). Thereby, per-household sales of nursery products has averaged approximately $139 over the last few years (7). Given current trends, the nursery and greenhouse industry can be classified as a mature market since rapid growth has transitioned into slower growth whereby nearly all potential buyers are already users of the industry's products (5).

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Although aggregate industry information is available, there is little information accessible comparing the business and marketing practices of firms within the industry. Considering the increasingly competitive nature of the market and variations in experience of the green industry across states, component assessments are needed to assist stakeholders in managerial decision making. Therefore, the main goal of this study was to identify structural adjustments in the nursery industry that occurred during the 1988 to 2003 time period as indicated by regional changes in the use of information technologies (computer usage) and changes in marketing practices (trade show participation, repeat customers, sales transaction methods, wholesale/retail sales, wholesale categories, and advertising allocations).

Materials and Methods

In order to facilitate a better understanding of firm-level decision making within the nursery industry, the USDA S-103 (now S-1021) Multistate Research Committee has conducted four separate surveys (1989, 1993, 1998, and 2004) to obtain information on business, production, and marketing practices at the national level. Each of these studies was funded, in part, by the Horticulture Research Institute. For this study we utilized the 1989 and 2004 surveys to better understand whether business and marketing practices had changed over the last two decades.

The inaugural 1989 national survey provided in-depth questions regarding items from computer usage and types of sales to ways the firm did business during 1988. The 1989 survey was distributed by mail and each state varied in the selection process for nurseries in that state. Some states contacted all licensed nurseries while others limited the number of nurseries surveyed to those meeting minimum acreage requirements, a random sample of all nurseries, or a percentage of total production. A total of 23 states participated in the original survey representing a total of 1,504 respondents. Detailed analysis of the 1989 survey can be found in Brooker and Turner (3). A synopsis of their results

indicated that telephone and person-to-person transactions were by and large the most frequent exchange method, on average 2.8% of sales were allocated to advertising, and a larger portion of advertising dollars for the nursery industry was used on catalogs and trade shows.

The most recent survey conducted in 2004 gathered data on decisions made in 2003 and included 44 states with 2,485 total respondents representing 93% of grower cash receipts. Sampling for the 2004 survey was done by grouping nurseries as small (less than 5 acres), medium (5 to 20 acres), or large (20 or more acres) based on acreage from each of the 44 states. Surveys were then targeted so as to sample 100% of large nurseries, 60 percent of the medium nurseries, and 25 percent of the small nurseries. In depth analysis of the 2004 survey can be found in Brooker et al. (2), while regional comparisons are in Behe et al. (1) and Hodges et al. (9). Main findings by Brooker et al. (2) were that entry of new firms into the nursery industry had increased since 2000; the major transaction methods used were again telephone orders and in-person orders; retail sales accounted for 19.6% of sales, while wholesale accounted for 80.4%, and the export market accounted for only a small portion of the total sales dollars at 1.8%; and over 60% of respondents in the states surveyed reported word processing as a use for computers in their firms.

Published analyses of each of the 1989 and 2004, as well as the 1993 and 1998, multistate committee surveys focused on survey descriptions of business and marketing practices. Except on a single-state basis, little attention has been given to the dynamic information available across surveys. Nevertheless, separate descriptive analyses do suggest important structural changes have occurred in the industry since the first survey in 1989. Brooker, Turner and Hinson (4) compared changes in the 1994 and 1998 surveys and found that sales to repeat customers declined, advertising as a percentage of sales increased from 2.8 to 4.3%, respectively, and that participation in trade shows declined, but the share of sales at trade shows has showed little change.

Of the 23 states included in the 1989 survey and 44 states included in the 2004 survey, there were 21 states that were involved in both surveys. For our analysis, only states participating in both the 1989 and 2004 survey were used. Also, some questions in the 2004 survey were modified from their 1989 form in order to improve accuracy and capture changes in industry terminology. Due to these modifications, some questions and/or response categories are unique to a particular survey and cannot be used in time-series comparisons. However, the questions that are of direct interest to this study are comparable. The question utilized to evaluate changes within business operations was the use of computers for various functions (i.e., word processing, accounting, inventory, financial investing, and internet commerce).

Several questions relating to changes in marketing practices and sales were also analyzed, including: number of trade shows attended during the prior year; percentage of sales made to repeat customers; percentage of sales transactions made using trade show orders, telephone orders, in-person orders and mail orders; percentages of sales made at the retail and wholesale levels; and percentage of wholesale sales made to mass merchandisers, landscape firms and re-wholesalers.

To better understand structural changes occurring within the industry, respondents were divided into regions in order to determine if changes were regionalized. Survey responses were divided into the Southern, Northern, or Western region depending on the state the responding firm indicated as their home state (Table 1).

Table 1. Listing of states included in both the 1989 and 2003 national surveys of the nursery industry.

Southern Region	Northern Region	Western Region[z]
AR	CT	CA
FL	DE	OR
GA	IL	
KY	ME	
LA	MI	
MS	NJ	
NC	NY	
OK	OH	
SC	PA	
TN		

[z]Only two states in the western region reported for both surveys. These two states accounted for approximately 24.1% of the total U.S. nursery sales for 2002 (12), while no state reported in both surveys for the eastern region.

In order to compare responses for 1989 and 2004 for the various variables of interest, one of two methods was used. The method used depended upon the type of response given to the question. For questions with binary responses (i.e., yes/no), a *t* test was performed to determine if significant differences were present between the variable means for the two surveys. The null hypothesis for the use of the *t* test is that the mean of the question in the 1989 survey is equal to that of the 2004 survey. The alternative to the null hypothesis is that means in the two surveys are not equal. To perform the *t* test a *t*-computed value (Tc) was calculated using equation 1 where $\overline{X_{i,1}}$ and $\overline{X_{i,2}}$ are sample means for 1988 and 2003, respectfully, with i representing geographic grouping, and $S^2_{i,p}$, equation 2, is the combined sample variances of the 1988 and 2003 data; assuming samples are statistically independent.

$$Tc = \frac{\overline{X_{i,1}} - \overline{X_{i,2}}}{\sqrt{S^2_{i,p} / n_{i,1} + n_{i,2}}} \quad [1]$$

$$S^2_{i,p} = \frac{\sum_{i=1}^{n_2} (x_{i,1} - \overline{x_1})^2 + \sum_{i=1}^{n2} (x_{i,2} - \overline{X_2})^2}{(n_1 - 1)(n_2 - 1)} \quad [2]$$

For questions with multiple responses, a chi square test of independence was performed. The chi-square tests of independence and *t* tests were performed by grouping the states into regions for comparison. The null hypothesis for these tests is that response patterns do not vary systematically by group by survey. The alternative hypothesis is that the response patterns vary systematically. The chi-square computed value is shown below, where, f_o represents the observed frequency and f_e represents the expected frequency. For both the *t* test and the chi-square tests of independence, significant computed values are justification for rejection of the null hypotheses and acceptance of the alternatives.

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} \quad [3]$$

Table 2. Mean percentage of sales transaction methods for 1988 and 2003 as indicated by nursery and greenhouse grower respondents in the S-1021 national survey.[z]

	2003			1988			
Categories	**N**	**Mean**	**STD Dev**	**N**	**Mean**	**STD Dev**	***t* value**
Northern Region							
Trade show orders	796	1.93	7.80	601	4.64	12.33	–10.14*[y]
Telephone orders	796	28.89	34.10	601	34.18	31.55	–5.99*
In-person orders	796	60.32	39.45	601	55.11	36.03	5.12*
Mail orders	796	2.83	11.77	601	6.06	16.81	–8.53*
Southern Region							
Trade show orders	895	3.15	9.83	635	6.81	13.02	–12.61*
Telephone orders	895	42.41	37.02	635	39.16	31.82	3.59*
In-person orders	895	47.51	38.58	635	49.41	35.30	–1.97**
Mail orders	895	3.23	14.04	635	4.62	15.23	–3.68*
Western Region							
Trade show orders	276	2.77	8.23	201	3.16	8.92	–0.97
Telephone orders	276	36.76	36.05	201	38.17	32.94	–0.87
In-person orders	276	51.28	39.42	201	52.97	34.71	–0.96
Mail orders	276	6.29	18.13	201	5.70	14.72	0.75

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

Significance at both the 0.05 and 0.01 level is denoted in the results tables. It is also important to note that differences in the question response categories between the surveys did not allow for the comparison of all response categories. This resulted in percentages of some of the questions not totaling to 100%.

Results and Discussion

Results of the t *tests.* The mean percentage of trade show orders have declined significantly for all three regions (Table 2). There is some anecdotal evidence suggesting that growers have used other advertising methods due to a change in the nature and structure of trade shows. Trade shows were originally focused on sales, but in the last few years have shifted focus to more public relations activities to enhance relationships with customers. Since trade shows are not a primary sales venue, some growers have decreased the number of shows they attend; however, as noted below, there has been increased spending on advertising at trade shows. Decreased attendance and increased advertising seems to imply a more concerted effort to maximize visibility at shows that have the higher probability of leading to future sales allocating money to other advertising outlets. This is also shown in the data regarding percentage of sales transaction methods. The percentage of sales at trade shows has declined over the period, while in-person and telephone orders are major sales transaction methods (Table 2).

Further analysis of the percentage of sales by transaction method (Table 2) indicated that the Northern and Southern regions experienced significant changes in method type, most notably increases for in-person orders in the Northern region and increased telephone orders in the Southern regions, while the Western region had no significant changes. As noted above, these increases could be the result of the shifting emphasis of trade shows toward public relations, thereby, leading to future sales that occur via alternative sales methods.

The mean percentage of sales transactions with repeat customers has remained statistically unchanged for the Northern and Southern regions (Table 3). The Western region, however, declined from 78.7 percent in 1988 to 71.2 percent in 2003 displaying statistical differences in the mean percentage of sales transactions with repeat customers. Even though sales transactions with repeat customers have declined (not statistically for either the Northern or Southern region) for all regions over the period, repeat customer sales still remain an important part of nursery business accounting for about 70% of sales transactions.

Table 3. Mean percentage of sales transactions with repeat customers for 1988 and 2003 as indicated by nursery and greenhouse grower respondents in the S-1021 national survey.[z]

	2003			1988			
Region	**N**	**Mean**	**STD Dev**	**N**	**Mean**	**STD Dev**	***t* value**
Northern Region	796	69.71	27.63	601	70.18	26.47	–0.65[y]
Southern Region	895	73.79	27.59	635	75.01	24.15	–1.81
Western Region	276	71.20	28.62	201	78.74	24.44	–6.11*

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

Table 4. Mean percentage of total sales to wholesale and retail outlets for 1988 and 2003 as indicated by nursery and greenhouse grower respondents in the S-1021 national survey.[z]

	2003			1988			
Categories	**N**	**Mean**	**STD Dev**	**N**	**Mean**	**STD Dev**	***t* value**
Northern Region							
Wholesale	771	47.43	42.84	578	65.51	39.26	–16.06*[y]
Retail	771	52.57	42.84	578	34.49	39.26	16.06*
Southern Region							
Wholesale	870	72.71	39.50	620	79.71	33.40	–7.28*
Retail	870	27.29	39.50	620	20.29	33.40	7.28*
Western Region							
Wholesale	270	64.16	43.40	191	85.15	29.06	–11.82*
Retail	270	35.84	43.40	191	14.85	29.06	11.82*

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

Table 4 indicates that the mean percentage of total sales attributed to wholesale outlets has declined significantly for all regions over the two decade time period, compared with the significant increase associated with retail percentage for all regions. Recent evidence has shown a division in growers in the nursery industry. This bipolarization is demonstrated in the results of this study with the percent of wholesale transactions declining and the percentage of retail increasing. Larger firms are beginning to contract with mass merchandisers and are growing fewer plant varieties while the smaller firms are remaining competitive by competing for retail business in differentiated niche markets (7). These firms are also showing signs of vertical coordination such as purchasing and/or marketing cooperatives (10). Examination of wholesalers' sales to mass merchandisers, landscape firms, and re-wholesalers has declined over the period for all regions which correlates with the decline in wholesale transactions (Table 5).

Recent maturing of the nursery industry and more fierce competition has led to a greater focus on marketing and advertising efforts. Catalogs and trade shows are major marketing channels in the nursery industry, with catalogs among the most important marketing tools that growers possess. Catalogs not only identify products that nurseries produce but also aid customers in making buying decisions and identify specializations of the firm (8). The mean percentage of total sales spent on advertising was statistically significant for all regions (Table 6). The major advertising changes across regions were the increased percentage of sales spent on radio/television advertising and at trade shows. Given the increased number of growers selling retail and the prevalence of radios and televisions within our society, this increase was expected, as was the increased advertising at trade shows given their importance as a marketing tool. Catalogs also experienced significant increases except for the Western region; however, the increases cannot be partitioned to increases from web verses printed formats.

Results of the Chi-Square tests. Computers can assist nursery businesses in managing large amounts of complex

Table 5. Mean percentage of sales for wholesale categories for 1988 and 2003 as indicated by nursery and greenhouse grower respondents in the S-1021 national survey.[z]

	2003			1988			
Categories	**N**	**Mean**	**STD Dev**	**N**	**Mean**	**STD Dev**	***t* value**
Northern Region							
Mass merchandisers	796	23.50	35.29	516	29.46	29.77	–6.50*[y]
Landscape firms	796	33.37	40.63	516	49.70	35.22	–15.33*
Re-wholesalers	796	14.49	28.33	516	20.83	27.74	–8.18*
Southern Region							
Mass merchandisers	895	22.39	33.20	572	31.29	30.37	–10.61*
Landscape firms	895	31.35	37.06	572	38.82	32.55	–8.09*
Re-wholesalers	895	27.65	35.72	572	29.88	32.52	–2.48**
Western Region							
Mass merchandisers	276	28.77	38.20	184	39.58	33.99	–6.34*
Landscape firms	276	17.76	31.48	184	26.77	32.63	–6.04*
Re-wholesalers	276	28.03	37.16	184	33.65	33.73	–3.36*

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

Table 6. Mean percentage of total sales spent on advertising and allocation of advertising dollars for 1988 and 2003 as indicated by nursery and greenhouse grower repsondents in the S-1021 national survey.[z]

	2003			1988			
Categories	**N**	**Mean**	**STD Dev**	**N**	**Mean**	**STD Dev**	***t* value**
Northern Region							
Percentage of total sales	704	3.76	5.35	601	2.07	3.58	13.25*[y]
Allocation of adv. dollars[x]							
Yellow pages	462	4,020	19,980	580	1,414	4,256	6.15*
Radio/TV	462	4,553	40,926	580	639	4,130	4.61*
Billboards	462	321	1,937	580	373	3,761	0.54
Catalogs	462	19,874	190,302	580	5,145	26,309	3.71*
Trade journals	462	2,188	11,102	580	3,292	26,507	–1.69
Newsletters	462	3,519	19,402	580	2,418	11,111	2.31**
Trade shows	462	6,420	31,419	580	3,523	21,368	3.56*
Other	462	7,790	45,712	580	8,946	51,217	–0.76
Southern Region							
Percentage of total sales	776	3.94	7.56	635	2.42	5.20	8.63*
Allocation of adv. dollars[x]							
Yellow pages	517	3,755	18,220	598	2,984	35,333	0.90
Radio/TV	517	1,498	10,275	598	104	833	6.63*
Billboards	517	149	1,219	598	74	862	2.40**
Catalogs	517	9,831	84,718	598	3,444	14,847	3.63*
Trade journals	517	5,814	30,567	598	1,986	8,774	5.87*
Newsletters	517	1,377	7,782	598	1,784	12,994	–1.25
Trade shows	517	24,567	181,630	598	6,076	26,292	4.93*
Other	517	15,958	221,161	598	5,265	53,764	2.29**
Western Region							
Percentage of total sales	235	3.77	7.90	201	1.81	7.50	5.30*
Allocation of adv. dollars[x]							
Yellow pages	157	4,891	26,566	195	3,080	19,602	1.48
Radio/TV	157	970	7,462	195	40	415	3.50*
Billboards	157	26	212	195	0	0	3.49*
Catalogs	157	6,668	26,381	195	14,566	141,675	–1.39
Trade journals	157	3,276	12,714	195	11,751	108,131	–1.96**
Newsletters	157	5,392	41,182	195	1,988	12,894	2.19**
Trade shows	157	8,746	24,066	195	4,675	22,968	3.26*
Other	157	5,073	11,288	195	9,888	76,102	–1.58

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

[x]Values expressed in 2003 dollars (GDP Implicit Price Deflator, U.S. Department of Commerce).

information and making daily operations run more efficiently (5). Given this, computer usage has increased for all regions evaluated over the two decade period. In 1988, nearly 44% of firms reported using computers for some function in their operation, while this increased to about 78% in 2003.

Examination of the role of computerized information technologies across regions (Table 7) provides some interesting results. Each method of computer usage was classified as 'currently in use', 'planned to be used', or 'neither planned or in use'. All regions show significant proportional changes in the use of computers for word processing with large increases in the 'current' usage. The use of computers for accounting functions demonstrated similar results across regions with increases in 'currently in use' and decreases in 'planned' and 'neither planned or in use'.

The use of computers for inventory purposes demonstrated increases in 'currently in use' and the 'neither planned or in use' categories between 1988 and 2003 for the Northern and Western regions. The Southern region increased in the 'currently in use' and decreased in the 'planned' and 'neither planned/in use' categories. Using computers for financial analyses/investments also increased for all regions between 1988 and 2003. The Western region had the greatest proportion currently 'in use' at 29% followed by the Northern and Southern regions at 25.1 and 23%, respectfully. The use of computers for internet commerce also increased for all regions between 1988 and 2003. The Northern region had the lowest percentage use of internet commerce at 24.2% followed by the southern at 28.3% and the western at 33.0%. All computerized functions examined were statistically significant at the 5 percent level between 1988 and 2003 implying that the response patterns vary systematically by survey year.

There have been a number of changes in the ways the nursery and greenhouse industry conducted business in 1988 as compared with 2003. As seen by the changes in business practices over the time period in question, significant changes have occurred in sales transaction methods, sales to wholesale and retail outlets, allocation of advertising dollars and computerization.

As expected, the percent of total sales spent on advertising has increased significantly, particularly for media such as yellow pages, billboards, trade journals, newsletters, and trade shows. Given these findings, it is clear that the

Table 7. Computerized functions of firms shown as frequencies and percentages for 1988 and 2003 as indicated by nursery and greenhouse grower respondents in the S-1021 national survey.[z]

	2003				1988				
		Neither	Planned	Now		Neither	Planned	Now	
Function	N	Num (%)	Num (%)	Num (%)	N	Num (%)	Num (%)	Num (%)	chi-square
Northern Region									
Word processing	796	293 (36.8)	22 (2.8)	481 (60.4)	421	321 (76.2)	80 (19.0)	20 (4.8)	379.87*[y]
Accounting	796	321 (40.3)	57 (7.2)	418 (52.5)	601	252 (41.9)	133 (22.1)	216 (35.9)	77.36*
Inventory	796	411 (51.6)	91 (11.4)	294 (36.9)	601	284 (47.3)	159 (26.5)	158 (26.3)	56.51*
Financial investments	796	551 (69.2)	45 (5.7)	200 (25.1)	601	508 (84.5)	59 (9.8)	34 (5.7)	96.04*
Internet commerce	796	539 (67.7)	64 (8.0)	193 (24.2)	601	460 (76.5)	71 (11.8)	70 (11.6)	37.65*
Southern Region									
Word processing	895	312 (34.9)	23 (2.6)	560 (62.6)	635	427 (67.2)	81 (12.8)	127 (20.0)	287.26*
Accounting	895	314 (35.1)	63 (7.0)	518 (57.9)	635	327 (51.5)	122 (19.2)	186 (29.3)	135.37*
Inventory	895	441 (49.3)	103 (11.5)	351 (39.2)	635	355 (55.9)	159 (25.0)	121 (19.1)	91.81*
Financial investments	895	630 (70.4)	59 (6.6)	206 (23.0)	635	559 (88.0)	41 (6.5)	35 (5.5)	87.15*
Internet commerce	895	575 (64.2)	67 (7.5)	253 (28.3)	635	494 (77.8)	80 (12.6)	61 (9.6)	82.90*
Western Region									
Word processing	276	73 (26.4)	5 (1.8)	198 (71.7)	201	79 (39.3)	34 (16.9)	88 (43.8)	53.64*
Accounting	276	76 (27.5)	14 (5.1)	186 (67.4)	201	56 (27.9)	49 (24.4)	96 (47.8)	40.40*
Inventory	276	115 (41.7)	27 (9.8)	134 (48.6)	201	72 (35.8)	52 (25.9)	77 (38.3)	21.95*
Financial investments	276	182 (65.9)	14 (5.1)	80 (29.0)	201	162 (80.6)	17 (8.5)	22 (10.9)	23.21*
Internet commerce	276	164 (59.4)	21 (7.6)	91 (33.0)	201	128 (63.7)	28 (13.9)	45 (22.4)	9.44*

[z]The 1989 and 2004 surveys collected data for 1988 and 2003, respectively.

[y]Significance levels are denoted: * = 0.1 significance level; ** = 0.05 significance level. A significant *t* test is justification for rejecting the null hypothesis that the means are not different between the two years.

industry has recognized the need to focus on concentrated efforts to keep repeat customers through more 'traditional' advertising efforts.

Given the changes taking place within the industry, it is interesting that not all regions have evolved in the same manner. The transaction methods within the Northern region have experienced an increase in in-person sales with a reduction in sales via telephone, whereas the Southern region shows an increase in telephone sales with decreased in-person sales. Other interesting differences can be seen by comparing the magnitudes associated with each regions' percentage of sales from retail and wholesale. Even though wholesale sales as a percentage of total sales have decreased over the past two decades for all regions, the Southern and Western regions utilize wholesale sales to a higher degree than the Northern region.

Finally, as expected, computer usage has increased for a variety of tasks, including: word processing, accounting, inventory control, financial investments, and internet commerce. Those businesses failing to adopt these technologies are most likely experiencing considerable losses in efficiency given the decreased amount of labor hours needed if computer technologies are utilized. These losses in efficiency could translate into increased costs and thereby less profitability.

Literature Cited

1. Behe, B.K., J.H. Dennis, C.R. Hall, A.W. Hodges, and R.G. Brumfield. 2008. Regional marketing practices in U.S. Nursery Production. HortScience 43:2070–2075.

2. Brooker, J., D. Eastwood, C. Hall, K. Morris, A. Hodges, and J. Haydu. 2005. Tradeflows and marketing practices within the United States nursery industry: 2003. Univ. Tennessee Southern Coop. Bul. 404.

3. Brooker, J.R. and S.C. Turner. 1990. Trade flows and marketing practices within the United States nursery industry. Univ. Tennessee Southern Coop. Bul. 358.

4. Brooker, J.R., S.C. Turner, and R.A. Hinson. 2000. Trade flows and marketing practices within the United States nursery industry. Univ. Tennessee Southern Coop. Bul. 397.

5. Hall, C.R. 2007. How to survive a maturing nursery market. Nursery Management and Production, March:53–57.

6. Hall, C., J. Brooker, and D. Eastwood. 2004. The status of computerization in the U.S. nursery industry. SNA Res. Conf. 49:495–498.

7. Hall, C.R., A.W. Hodges and J.J. Haydu. 2005. Economic impacts of the green industry in the United States. Final Report to the National Urban and Community Forestry Advisory Committee.

8. Helms, L.C., C. Laurent, and M. McCoy. 1996. Marketing and promoting in the green industry: Success stories from the field. Wholesale Nursery Growers of America.

9. Hodges, A.W., C.R. Hall, B.K. Behe, and J.H. Dennis. 2008. Regional analysis of production practices and technology use in the U.S. nursery industry. HortScience 43:1807–1812.

10. Hughes, D.W. and R.A. Hinson. 2000. Estimating the value of the green industry to Louisiana's economy. J. Agribusiness 18:207–220.

11. Jerardo, A. 2007. Floriculture and nursery crops yearbook. U.S. Dept. Agr., Econ. Res. Serv. FLO-2007, Washington, DC. Accessed August 28, 2008. http://www.ers.usda.gov/Publications/Flo/2007/09Sep/FLO2007.pdf

12. U.S. Department of Agriculture, National Agricultural Statistics Service. 2004. 2002 Census of Agriculture. United States Summary and State Data, Vol. 1, Geographic Area Series, Part 51, AC-02-A-51. United States Department of Agriculture, Washington, DC, June.

13. U.S. Department of Agriculture, Agricultural Economic Research Service. 2008. United States: Leading commodities for cash receipts, 2007. Accessed August 28, 2008. http://www.ers.usda.gov/Data/FarmIncome/firkdmuXLS.htm