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64

MARKETING STRATEGY EFFECTS ON CONTRACTOR PERCEPTIONS OF RESIDENTIAL SIDING MATERIALS

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March 1998

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Executive Summary

The market for residential siding materials has become increasingly competitive over the past two decades. An increasing assortment of substitute materials, coupled with aggressive promotional and product-service campaigns of competitors, prompted the Western Red Cedar Lumber Association (WRCLA) to focus on marketing programs which would enhance the image and market share of western red cedar siding in the North American market. In 1995, the WRCLA commissioned the Center for International Trade in Forest Products (CINTRAFOR) to conduct an in-depth study of the Puget Sound residential siding market. The results of the 1995 CINTRAFOR study became a component for implementing the WRCLA's Puget Sound test market strategy in 1996.

The current study was commissioned by the WRCLA and reports the results of a mail survey conducted during the fourth quarter of 1996 examining the Puget Sound residential siding market. The fundamental purpose of this study was to assess the impact of the WRCLA's residential siding promotional strategy in the Puget Sound market over the period of November 1, 1995, to November 1, 1996. The results of this survey were combined with the results of the 1995 survey in order to assess (1) residential siding usage patterns over time, (2) consumer perceptions of residential siding materials before and after the WRCLA promotional campaign, and (3) consumer exposure to the WRCLA promotional campaign and the effects of exposure.

The survey results indicate significant instability in the Puget Sound residential siding market, with most of the instability being caused by a huge decline in the use of OSB siding and a considerable gain in the use of wood-fiber cement siding. OSB experienced a 32.6% decline in market share in the one year time period between the two surveys; this decline represents over 5.362 million square feet of siding material. Most of OSB siding's market share decline was compensated by wood-fiber cement, which increased its market share to 18.3% from 3.21%. The average number of different siding materials builders are utilizing from one year to the next also measures instability. Results from the first survey indicate that builders used an average of 2.66 siding materials in 1994. This average increased to 3.56 the following year.

Western red cedar's 1995 market share in the Puget Sound residential siding market was 6.05% as compared to 8.86% in 1994, representing a decline of 31.7%. We must stress that lower overall market share does not signify that the WRCLA promotional campaign was ineffective. Market share can always be "bought" through several means (*e.g.*, selling high volumes of low quality and low priced cedar in the lower-end home market), but higher market share does not necessarily translate into higher margins and profitability. Additionally, we were not overly surprised to see a decline in western red cedar's market share since (1) cedar was being heavily utilized in the lower-end home market (while the promotional effort of the WRCLA was targeting the high-end market) and (2) there has been a steady rise in the price of western red cedar siding over the past year which has priced many low-end builders out of the cedar market. Note that the lack of price and shipment data from association membership has made analysis and interpretation of demand effects for western red cedar siding somewhat difficult.

Despite the decline in market share, several favorable changes were seen in western red cedar siding usage patterns. The 1995 survey results indicated that for every builder who increased use of cedar siding between 1990 to 1994, 15.3 builders decreased their use. Over the past year, however, this negative pattern reversed; for every builder increasing use of western red cedar siding, only 0.7 builders decreased their use. Furthermore, survey results indicate that western red cedar siding use has been declining in the lower-end housing market while increasing in the upper end. Combined, the market share and usage pattern results suggest that western red cedar siding is beginning to hit an upswing. Unfortunately, the instability of the Puget Sound siding market has played havoc with estimating reliable market share trends. It is very likely that at least one or two years will have to pass before market shares for the various siding materials lose their volatility.

Survey results from the past two years clearly reveal that builder preferences for western red cedar on upper end homes have increased, while preferences for western red cedar siding on lower-end homes have declined. In other words, as the price of a new home increases, builders increasingly display a preference for western red cedar siding.

These results are one indication that the WRCLA promotional strategy has been effective in changing builder perceptions.

The WRCLA promotional campaign was also successful in the level of exposure that it achieved among Puget Sound builders. Nearly 50% of all Puget Sound builders recalled having seen at least three WRCLA promotional advertisements over the past year. Furthermore, the survey results indicated that the purchasing decisions of approximately 12.5% of all builders in the Puget Sound market were influenced by the WRCLA promotional advertisements. This percentage of purchasing decision influence is very high for an industrial product; past market research for other industrial products indicates that advertising generally influences only 3 to 5% of all purchasing decisions within a given market.

Approximately 9% of all builders indicated that they perceived that western red cedar siding had decreased in overall quality over the time period covering the two surveys. Over 14% of all builders, however, indicated that they perceived an increase in overall western red cedar siding quality over the same time period; the remaining 77% of builders indicated that they perceived no change in western red cedar quality. These numbers are even more encouraging when the data is disaggregated and applied only to builders who have used western red cedar siding over the past two survey periods. Nearly 65% of actual users of western red cedar siding perceived that the overall quality of western red cedar siding material had increased and 12% perceived a decrease.

In sum, the results of the survey presented in this report suggest that the WRCLA promotional strategy was effective. Overall builder perceptions of western red cedar residential siding have improved significantly in less than a one-year time span, especially in the higher-end home market. These results bode well for manufacturers, wholesalers, and retailers of western red cedar siding since higher margins are typically achieved in the higher-end home market. It is expected that the improving builder perceptions of cedar siding will begin to pay off as high-end builders start to shift to a product that possesses an increasingly high-status image and reliable quality.

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Objectives

The information presented in this report is a consolidation of past and present research conducted by the Center for International Trade in Forest Products (CINTRAFOR) on behalf of the Western Red Cedar Lumber Association (WRCLA), assessing the Puget Sound residential siding market. Specifically, this report presents the results of a follow-up survey of residential builders and contractors operating within King, Pierce, and Snohomish counties conducted between October 11 and November 18, 1996. The first survey report, entitled *Survey of the Puget Sound Residential Siding Market*, was published in August 1995 as CINTRAFOR Working Paper 56. This follow-up study was initiated and designed to answer four questions:

- What are the current usage patterns for selected residential siding materials, and how do these patterns compare with those that existed prior to WRCLA's promotional campaign?
- What perceptions do end-users currently possess for selected residential siding materials, and how do these perceptions compare with those that existed prior to the WRCLA's promotional campaign?
- To what degree were respondents exposed to the WRCLA promotional campaign for western red cedar siding?
- What are the primary differences between those end-users that were exposed to the WRCLA's promotional campaign relative to those who were not exposed with regard to their perceptions of western red cedar siding?

Research Methodology

Sample Selection

The sample population in the follow-up survey was identical to the sample population in the previous survey, encompassing a cross-section of residential builders and contractors. The survey participants included new single-family homebuilders, new multi-family homebuilders, siding contractors, repair and remodeling contractors, nonresidential building contractors, and architects/designers.

The survey was specifically targeted to 96 firms that responded to the 1995 siding survey. These firms physically operate within the counties of King, Pierce, or Snohomish in the State of Washington. In addition, these firms built (or subcontracted) at least two residential units within King, Pierce, or Snohomish Counties during 1994 and 1995.

Data Collection

As in the previous study, a mail survey was chosen for this investigation since it provided the most efficient and cost-effective means of gathering data from a large, geographically dispersed population (Dillman, 1978). The questionnaire was constructed to be comparable in structure to the residential siding survey used in the previous study.

The survey mailing consisted of a cover letter, the questionnaire, a self-addressed, stamped business reply envelope, and a $1 bill as an incentive to participate in the follow-up survey (APPENDIX A). Two weeks after mailing the questionnaire to participants, a follow-up mailing was made. This mailing consisted of a follow-up cover letter encouraging the participant to complete and return their survey, another questionnaire in case the first one was misplaced, and a self-addressed, stamped business reply envelope.

Firms failing to reply to the follow-up letter and questionnaire were contacted by phone and/or fax to encourage their participation. A summary of the sampling plan and the response rates associated with the mail survey are presented in Figure 1.

Survey Response

Four survey packets were returned undelivered as a result of discontinued operations by these firms. Thus, the effective sample size was 92. Fifty-seven usable surveys were returned, yielding a response rate of 62%. This response rate was well above expectations and can likely be attributed to the $1.00 incentive included in the survey packets. Twenty-five of the firms (43.9%) were members of the Master Builders Association of Pierce County. The remaining 32 firms (56.1%) were members of the Master Builders Association of King and Snohomish Counties.

Nonresponse Bias

The use of follow-up letters and personal contacts with the firms by phone and/or fax was designed to maximize the rate of response to the survey. In general, higher rates of response to a mail survey imply lower rates of nonresponse bias (Malhotra, 1993). Bias can significantly influence the results and conclusions of a mail survey given the fact that nonrespondents can be very different from respondents. As a result, it is essential that data be evaluated to determine if nonresponse bias is present.

Bias caused by nonresponse was evaluated using a method developed by Armstrong and Overton (1977). This methodology used late respondents to the survey as a proxy for nonrespondents. A statistical test was used to compare the information of late respondents with that of early respondents. No significant difference was found between the two groups. Therefore, nonresponse bias was not considered to influence the results of the survey.

An additional methodology was utilized to determine if response bias influenced the results. This methodology involved the comparison of responses from firms which replied to the initial survey with those that replied to the follow-up survey. The purpose of this methodology was to determine if a statistical difference existed in how firms responded to the initial and follow-up surveys. A statistical test similar to the Armstrong and Overton nonresponse methodology was used to compare the two groups of respondents. Again, these tests revealed that there were no substantial differences in how firms responded to the initial and follow-up surveys.

General Data Analysis and Results

Respondent Profile

The initial question on the survey prompted firms to specify their *primary* business. As expected, the majority of firms were builders of single-family homes (86.0%). Multi-family homebuilders and repair and remodel contractors each represented 5.3% of the respondents. Residential developers and nonresidential building contractors each represented 1.7% of the remaining firms.

Table 1 provides a list of projects that builders performed in the past year that utilized residential siding. All firms indicated that they were involved with the siding of new single-family residential construction projects within the past year. In addition, approximately one-fourth of all firms indicated that they were involved with some aspect of siding in the construction of home additions and multi-family residential homes.

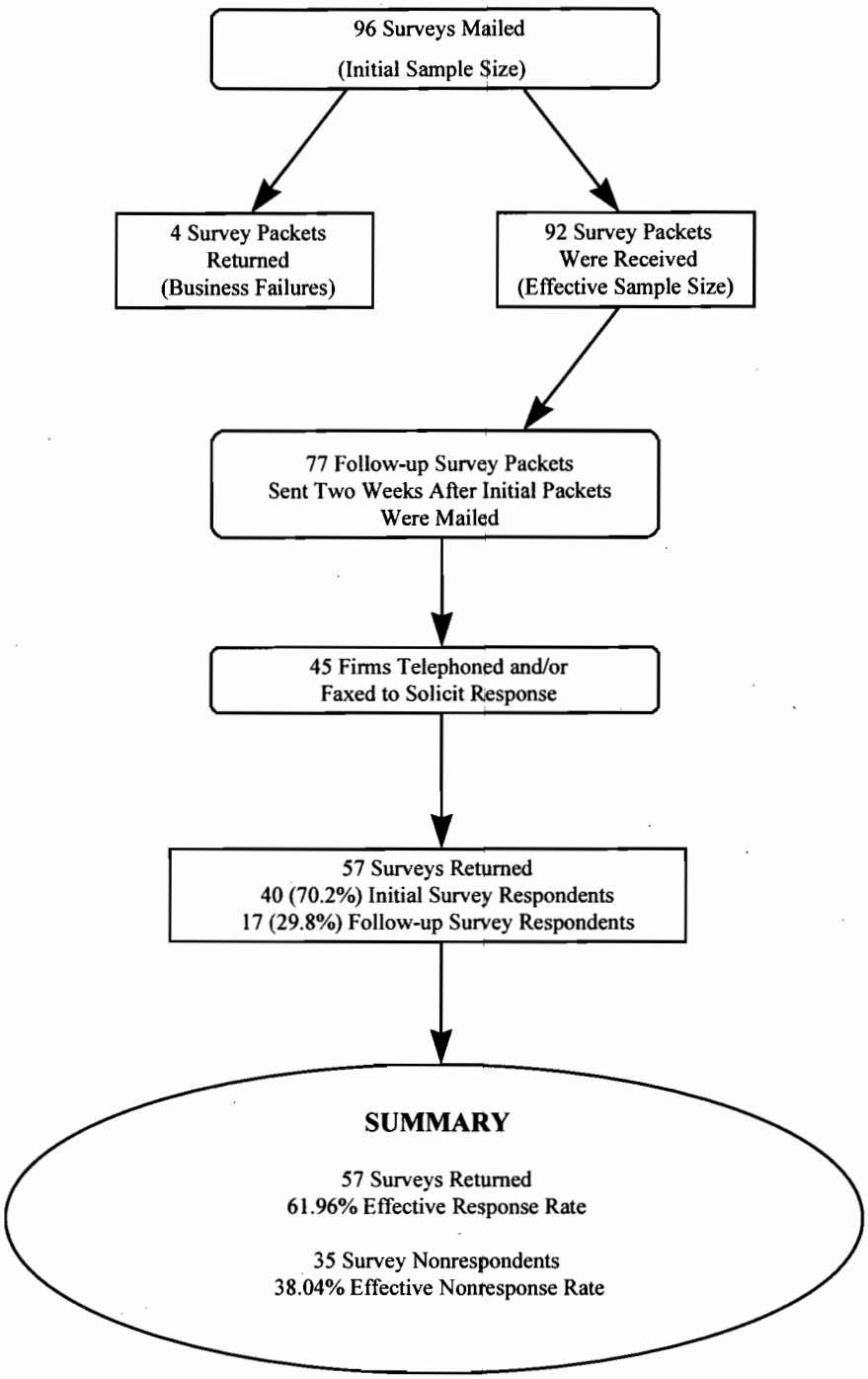

Figure 1. Schematic of mail survey execution for residential siding materials follow-up survey.

Table 1. Number of respondents performing various construction activities which involved siding, by builder type.

Builder Type	Construction Activity					
	Single-family Residential Construction	Multi-Family Residential Construction	Construction of Additions	Re-siding of Existing Homes	Repair of Existing Homes	New Non-Residential Construction
Single-family	49 (100.0%)[a]	8 (16.3%)	11 (22.4%)	5 (10.2%)	2 (4.1%)	4 (8.2%)
Multi-Family	1 (33.3%)	3 (100.0%)	0 (--)	0 (--)	0 (--)	0 (--)
Repair & Remodel Contractor	3 (100.0%)	0 (--)	3 (100.0%)	2 (66.7%)	3 (100.0%)	0 (--)
Nonresidential Building Contractor	0 (--)	1 (100.0%)	0 (--)	0 (--)	0 (--)	0 (--)
Developer	1 (100.0%)	1 (100.0%)	0 (--)	0 (--)	0 (--)	0 (--)
Total Responses	54 (94.7%)	13 (22.8%)	14 (24.6%)	7 (12.3%)	5 (8.8%)	4 (7.0%)

[a] Percentages represent the percent of builders within each builder type that performed the particular construction activity. Note that percentages within rows and columns do not total 100% because respondents could specify more than one type of construction activity.

The average revenue per firm was calculated to be slightly greater than $1 million during fiscal year 1995. Table 2 displays a breakdown of estimated 1995 revenue for the survey respondents. Approximately 30% of the survey respondents can be classified as small residential construction firms, with annual revenue less than $500,000. Nearly 50% of the surveyed firms can be considered mid-size residential construction firms, with annual revenue between $500,000 and $5 million. Another 20% are large residential construction firms, with annual revenues exceeding $5 million. Further examination of the survey database found that five of the six largest firms, in terms of annual revenue, are publicly-held corporations.

Table 2. Estimated total revenue for residential construction firms in 1995.

1995 Firm Revenue	Number of Firms[a]	Percent of Firms
Less than $100K	2	3.8
$100,000 to $499,999	14	26.4
$500,000 to $999,999	9	17.0
$1,000,000 to $4,999,999	17	32.1
$5,000,000 to $10,000,000	7	13.2
More than $10,000,000	4	7.5

[a] Data represents responses from 53 of the 57 surveyed firms.

The average price of homes built by respondents is displayed in Table 3. Over 72% of single-family residential home builders indicated that they built homes that averaged less than $250,000 in selling price. In fact, over one-half of all surveyed builders indicated that the average price of their homes was in the $150,000 to $250,000 range.

Table 3. Average price of homes firm currently builds, by builder type.

Average Price of Homes Currently Built by Firm	Total Responses	Builder Type[a] Single-family	Multi-Family	Repair & Remodel Contractor	Non-Residential Building Contractor
$100,000 to $149,999	11 (22%)	9	0	1	1
$150,000 to $199,999	16 (32%)	15	0	1	0
$200,000 to $249,999	10 (20%)	8	1	1	0
$250,000 to $400,000	8 (16%)	7	0	0	1
Over $400,000	5 (10%)	5	0	0	0
Total Responses	50 (100.0%)	44 (88.0%)	1 (2.0%)	3 (6.0%)	2 (4.0%)

[a] Data represents responses from 50 of the 57 surveyed firms.

Builders were asked to estimate where new homes selling in the upper-third price range started in price in the Puget Sound market. Responses ranged from a low $140,000 to a high of $600,000; this compares to a low of $130,000 and a high of $500,000 in the 1995 survey. On average, builders felt that a new, upper-third price range home started at a price of $289,706, with a standard deviation of $97,864; the 1995 survey average and standard deviation were $269,538 and $70,966, respectively. Utilizing this information and the data provided in Table 3, it was calculated that slightly more than one-fourth of the 1996 surveyed firms typically built residential homes in the upper-third segment of the market.

Demand for Residential Housing

The demand for single-family residential housing remained steady in the Puget Sound market over the 1994-1995 period. However, the multi-family market declined by approximately 57% over this two-year period, while the town house market declined by nearly 37%.

Table 4 displays the percent of survey respondents constructing single-family, multi-family, and town homes in various production volume categories in 1994 and 1995. Similarly, Table 5 displays the percent of residential structures survey respondents intended to build in 1996 and 1997 in various production volume categories. A conservative estimation technique was utilized to determine the total number of homes constructed in 1994 and 1995, as well as the number of homes to be constructed in 1996 and 1997. The results of this estimation procedure are shown in Table 6. Single-family residential homes represented approximately 65% of all residential structures constructed in the Puget Sound market in 1994; this number increased to 79% in 1995.

If the survey results are accurate, then it is conservatively estimated that nearly 6,800 new single-family homes will be constructed in the Puget Sound market in 1996 and approximately 3,800 will be constructed in 1997. These estimates suggest that the new residential construction market in Puget Sound may experience a substantial decline in the next 12 to 24 months. Furthermore, this decline could possibly be greater if there is a significant increase in the currently low mortgage interest rates in this market. Approximately 1,700 multi-family structures are estimated to be constructed in 1996, while the estimate for 1997 is about 950. Nearly 2,225 town house structures were expected to be constructed in 1996, and the forecast for 1997 is down by over 50% at approximately 1,023.

Table 4. Percent of respondents constructing single-family, multi-family, and town homes in 1994 and 1995.

	Firms Building (percent)					
	0 Units	1 to 5 Units	6 to 15 Units	16 to 50 Units	51 to 100 Units	Over 100 Units
Constructed in 1994:[a]						
Single-family Detached	13.2	29.2	29.2	20.1	7.3	1.0
Town House	90.6	2.1	2.1	3.1	--	2.1
Multi-family	84.4	5.2	3.1	4.2	1.0	2.1
Constructed in 1995:[b]						
Single-family Detached	3.8	32.7	19.2	32.7	5.8	5.8
Town House	76.9	7.7	7.7	--	7.7	--
Multi-family	56.2	12.5	6.3	12.5	12.5	--

[a] Based on 1995 survey data of 96 firms.
[b] Based on 1996 survey data of 57 firms.

Table 5. Percent of respondents forecasting to construct single-family, multi-family, and town homes in 1996 and 1997 (estimated).

	Firms Building (percent)					
	0 Units	1 to 5 Units	6 to 15 Units	16 to 50 Units	51 to 100 Units	Over 100 Units
Intend to Construct in 1996:[a]						
Single-family Detached	6.2	34.4	25.0	21.9	9.4	3.1
Town House	87.6	3.1	3.1	3.1	1.0	2.1
Multi-family	85.4	4.2	2.1	3.1	3.1	2.1
Intend to Construct in 1997:[b]						
Single-family Detached	5.6	29.6	16.7	37.0	3.7	7.4
Town House	53.8	7.7	7.7	15.4	--	15.4
Multi-family	46.7	26.7	6.7	6.7	6.7	6.7

[a] Based on 1995 survey data of 96 firms.
[b] Based on 1996 survey data of 57 firms.

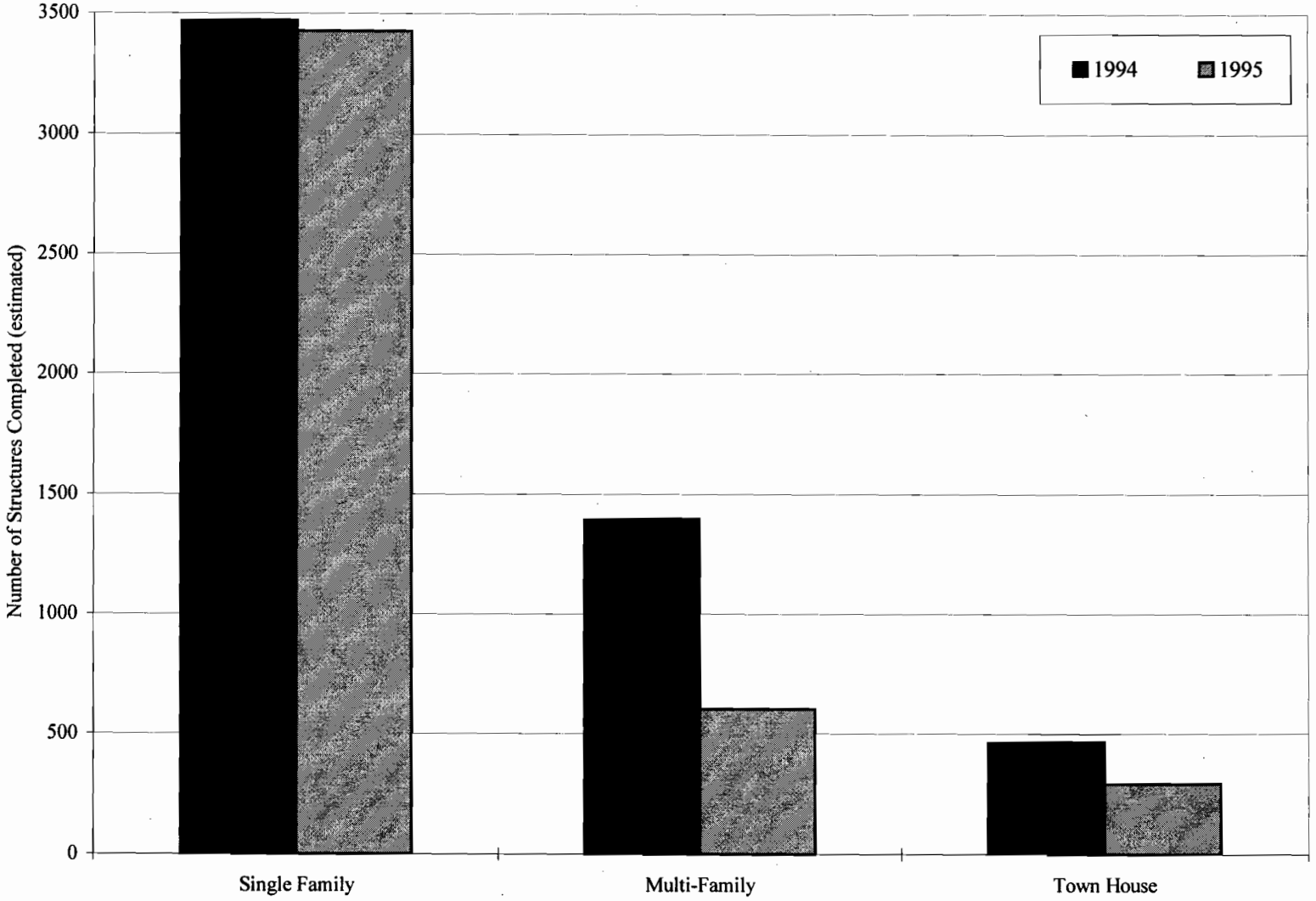

Figure 2. Estimate of the number of single-family, multi-family, and town house structures constructed in the Puget Sound market in 1994 and 1995.

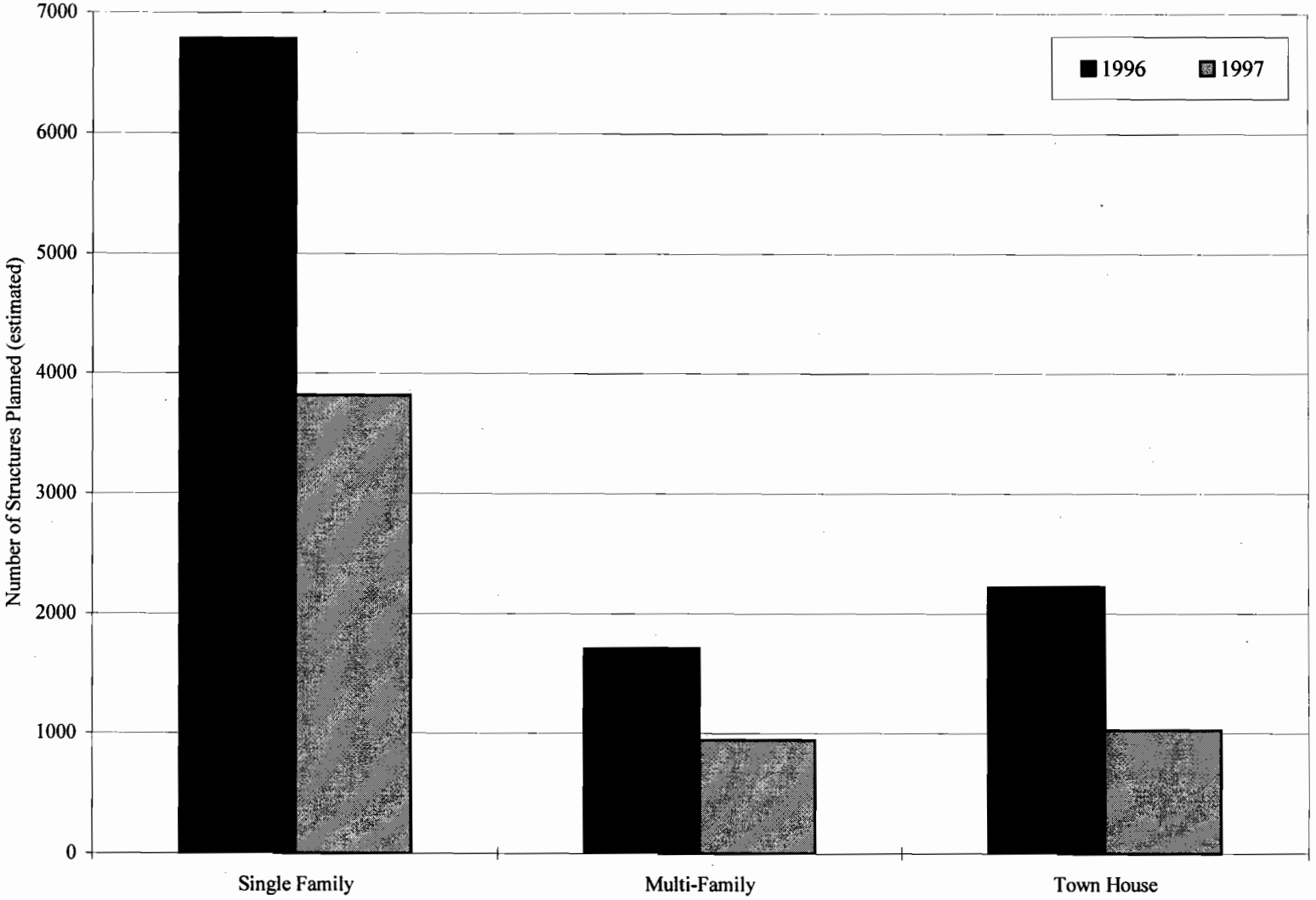

Figure 3. Forecast of the number of single-family, multi-family, and town house structures to be constructed in the Puget Sound market in 1996 and 1997.

Table 6. Estimation of the number of residential structures constructed in the Puget Sound market in 1994 and 1995, and the number of units expected to be constructed in 1996 and 1997.

Year	Estimated Number of Residential Structures Constructed			
	Single-family	Multi-Family	Town House	Total
Surveyed Firms				
Structures Completed:				
1994[a]	651	262	87	1,000
1995[b]	716	113	192	1,021
Structures Planned (estimated):				
1996[a]	1,272	320	417	2,009
1997[b]	716	177	192	1,085
Extrapolation to Puget Sound Market				
Structures Completed (estimated):				
1994[a]	3,472	1,397	464	5,333
1995[b]	3,427	602	293	4,323
Structures Planned (estimated):				
1996[a]	6,784	1,707	2,224	10,715
1997[b]	3,816	943	1,023	5,782

[a] Based on 1995 survey data of 96 firms.

[b] Based on 1996 survey data of 57 firms.

Market Share Estimates

The average firm installed 55,908 square feet of siding in 1994 (median = 20,000) and 53,346 square feet in 1995 (median = 27,000). Note that these averages are biased upward by five firms that each installed over 200,000 square feet of siding in 1994 and 1995. Further analysis of the data revealed that 22% (25% in 1994) of the firms installed less than 10,000 square feet of siding in the past 12 months. Approximately 30% (35%) of the firms installed between 10,000 and 30,000 square feet, 33% (28%) installed between 30,000 and 100,000 square feet, and 15% (12%) installed more than 100,000 square feet. These statistics, combined with the fact that housing construction has remained relatively static over the two survey periods, suggest a slight increase in the siding installation industry's concentration in the Puget Sound market.

Estimates of market share for various siding materials in the Puget Sound and national market are displayed in Table 7. These estimates indicate that some significant changes in market share have occurred in the Puget Sound market over the past two years. Most notably, OSB experienced a market share decline of 32.6% between 1994 and 1995, and recorded the largest decline on a square foot basis. OSB's 5.362 million square feet year-on-year decline is greater than the total usage of any other single competing siding material installed in 1994 or 1995 in the Puget Sound market. As a result, the distribution of OSB's lost square footage to other competing siding materials has led to substantial variability in the market share estimates for the other competing siding materials between 1994 and 1995.[1]

In 1994, the top five siding materials installed in the Puget Sound market were OSB, hardboard, plywood, cedar, and stucco. The top five materials in this market in 1995 were OSB, hardboard, wood-fiber cement, vinyl, and cedar. A more extensive longitudinal examination of the data revealed that the majority of the market share loss that OSB experienced was to wood-fiber cement and hardboard siding materials. Wood-fiber cement's market share increased by over 470%, while hardboard's increased by over 65%. Plywood, which experienced a market share decline of

[1] An exception to this statement is cedar shakes and shingles, which experienced a modest 4.8% increase in market share over this two year period.

more than 65% from 1994 to 1995, lost the majority of its market share to vinyl, whose market share increased by over 208% from 1994 to 1995.

The substantial year-on-year fluctuations in siding material market shares provide evidence that there is considerable instability in builder choice for residential siding products. Further evidence of market instability is provided by data indicating a dramatic change in the number of different siding materials used by builders in 1995 relative to 1994. Respondents used an average of 2.66 different siding materials over the course of 1994 (median = 2.50; standard deviation = 1.48). In 1995, this average increased to 3.56 different siding materials (median = 3.00; standard deviation = 1.46). In other words, respondents were utilizing a greater variety of siding materials in 1995 relative to 1994. This instability, however, provides substitute siding materials with an opportunity to challenge successfully those materials that have tended to dominate the market. For example, one survey respondent indicated that his suppliers were heavily pushing wood-fiber cement siding as an alternative to OSB. If wood-fiber cement's increase in market share is an indication of a successful wood-fiber cement manufacturer and distributor promotional strategy, then cedar siding manufacturers and distributors should consider executing a similar strategy aimed solely at high-end home builders currently utilizing OSB siding materials.

Table 7. Market share of various residential siding materials in Puget Sound and national markets.

Siding Product	1994 Puget Sound Market Share (percent)	1995 Puget Sound Market Share (percent)	Market Share Change 1994-1995 (percent)	1994 National Market Share (percent)[a]
OSB	49.53	33.36	-32.6	27.9[b]
Hardboard	12.47	20.63	+65.4	13.2
Plywood	10.33	3.50	-66.1	--[b]
Cedar (solid)	8.86	6.05	-31.7	2.5
Stucco	4.38	2.00	-54.3	--
Vinyl	3.82	11.77	+208.1	36.7
Brick	3.58	0.74	-79.3	17.2
Cedar Shakes/Shingles	3.34	3.50	+4.8	--
Wood Fiber-Cement	3.21	18.29	+470.8	--
Other (*e.g.*, metal)	0.25	0.14	-44.0	--
Spruce (solid)	0.24	0.00	--	--
Aluminum	0.01	0.02	+100.0	2.4
Redwood (solid)	0.00	0.00	--	--
Total	100.00	100.00	--	99.9

[a] National market share statistics from Shook and Eastin (1995), representing 1994 data.

[b] Plywood and OSB siding are combined to represent a national market share of 27.9%.

A conservative estimation procedure was used to assess the total area of various siding materials installed in the Puget Sound market in 1994 and 1995. The results of this procedure are displayed in Table 8. Relative to 1994, OSB and plywood appear to be losing their dominance in the Puget Sound market. For instance, the Puget Sound market represented 7.6% of the national OSB siding market and 2.5% of the national plywood siding market. In 1995, these figures decreased to 4.7% for OSB and 0.8% for plywood.

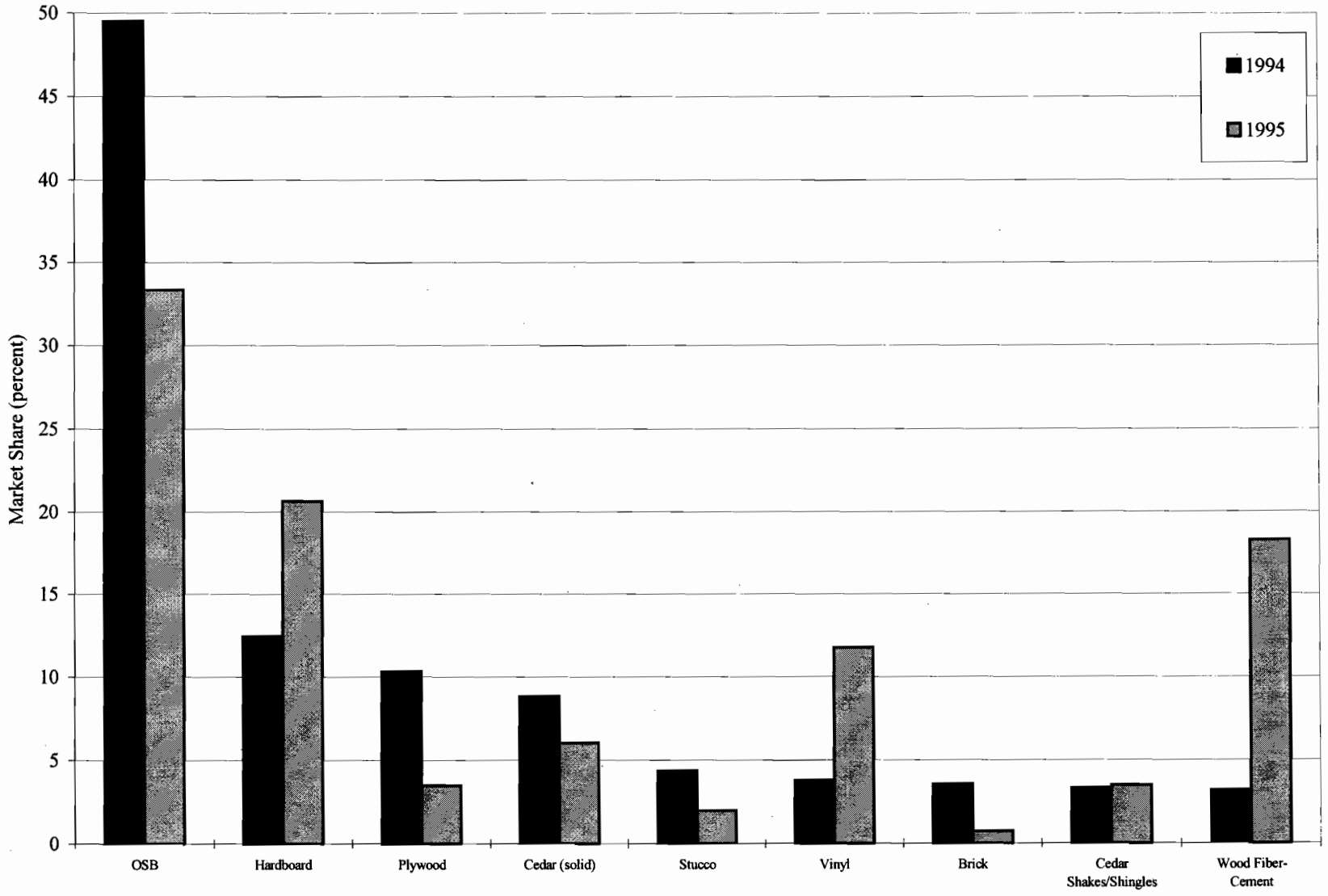

Figure 4. Market shares of various residential siding materials in the Puget Sound market, 1994 and 1995.

Table 8. Estimated square footage of various residential siding materials installed in the Puget Sound market, and the estimated share that the Puget Sound market represents for each residential siding material nationally, 1994 and 1995.

Siding Product	Estimated Square Feet Installed in Puget Sound Market		Estimated Share of the National Market Represented by the Puget Sound Market (percent)[a]	
	1994	1995	1994	1995
OSB	14,029,146	8,667,066	7.60	4.70
Hardboard	3,532,245	5,360,606	0.40	0.61
Plywood	2,927,467	908,401	2.48	0.77
Cedar (solid)	2,510,960	1,507,467	1.51	0.94
Stucco	1,239,867	519,734	NA[b]	NA[b]
Vinyl	1,081,440	3,058,992	0.04	0.12
Brick	1,012,693	192,292	NA	NA
Cedar Shakes/Shingles	945,467	909,988	NA	NA
Wood Fiber-Cement	908,480	4,751,076	NA	NA
Other (*e.g.*, metal)	72,000	35,193	NA	NA
Spruce (solid)	66,667	0	NA	NA
Aluminum	3,467	5,442	0.24	0.38
Redwood (solid)	0	0	NA	NA
Total	28,329,899	25,916,257		

[a] Calculated using 1994 product shipment data provided by various industry associations.

[b] Not available due to lack of data or unreliable product shipment data.

Patterns of Residential Siding Use

The results presented in Table 9 display the percent of firms indicating that their use of particular residential siding materials has increased, decreased, or remained the same from 1990 to 1994 and in 1995. In addition, Table 9 shows the percent of respondents who indicated that they had not used certain residential siding materials during these two periods. The information that firms provided over these two periods furnishes considerable insight into their usage patterns over time. For example, the 1990-1994 results indicate that for every builder who increased use of cedar siding, 15.3 builders reduced use. The 1995 usage data, however, indicates that for every builder who increased use of cedar siding, only 0.7 builders reduced use. Usage ratios for various siding materials are displayed in Figure 5. Although these results suggest that the decline in cedar siding use may have hit its bottom sometime around 1993 or 1994, they also indicate that there is a considerable segment (15.6%) of the Puget Sound residential siding market that has reduced its use of cedar siding. This reduction can partly be explained by the number of lower-end home builders being priced out of the cedar market given cedar's increased price relative to the previous year. Additionally, the reduction may be a reflection of a segment of the market that has not been reached by the WRCLA's marketing and promotional strategy. Nevertheless, the latest survey results are encouraging since they indicate a net gain in the total number of builders utilizing cedar as a siding material.

OSB was used by more builders than any other siding material from 1990 to 1994 (92%) and in 1995 (81%). Cedar siding was next, with 80% of the builders indicating that had used some amount of cedar siding from 1990 to 1994 and 71% indicating that they had used cedar in 1995.

Table 9. Usage patterns for various residential siding materials that firms have utilize, 1990-1994 and 1995.

	Percent of Firms Indicating That Their Use of Siding Material Has[a,b]								Ratio of Increased to Decreased Use of Siding[c]	
	Use Increased		Use Decreased		Use Remained the Same		Never Used			
	1990-94	1995	1990-94	1995	1990-94	1995	1990-94	1995	1990-94	1995
OSB	56.5	7.5	16.3	37.7	19.6	35.8	7.6	19.0	3.47	0.19
Hardboard	26.8	8.7	7.3	4.3	6.1	19.6	59.8	67.4	3.67	2.02
Cedar Shakes/Shingles	20.0	27.9	21.3	7.0	21.3	27.9	37.4	37.2	0.94	3.99
Stucco	16.9	11.9	14.3	2.4	19.5	33.3	49.3	52.4	1.18	4.95
Wood Fiber-Cement	16.9	28.3	1.3	2.2	2.6	15.2	79.2	54.3	13.00	12.86
Vinyl	16.5	16.3	3.8	0.0	10.1	20.9	69.6	62.8	4.33	--
Brick	13.4	8.9	18.3	6.7	46.3	48.9	22.0	35.5	0.73	1.48
Plywood	8.3	4.4	27.5	13.3	32.1	33.3	32.1	49.0	0.16	0.33
Cedar (solid)	3.6	22.2	54.8	15.6	21.4	33.3	20.2	28.9	0.07	1.42
Aluminum	1.3	0.0	6.7	0.0	5.3	4.8	86.7	95.2	0.20	--
Spruce (solid)	1.3	0.0	2.6	2.4	2.6	4.9	93.5	92.7	0.50	--
Redwood (solid)	0.0	0.0	5.3	0.0	4.0	4.8	90.7	95.2	--	--

[a] 1990-1994 responses based on 1995 survey of 96 firms

[b] 1995 responses based on 1996 survey of 57 firms.

[c] A number greater than 1 indicates that the installation of the siding material has generally increased among firms. Conversely, a number less than 1 indicates that the installation of the siding material has generally decreased among firms.

Table 10 compares the amount of solid cedar siding installed to the average price of homes currently being constructed by the surveyed firms. The survey results indicate that slightly over 36% of all firms had installed cedar siding in 1994. This percentage decreased very slightly to 35% in 1995. As Table 11 suggests, the use of cedar siding was found to be increasing on homes in the higher price ranges. For example, 32% of all the siding used on homes priced greater than $400,000 was solid cedar in 1994, and the percentage increased to 38% in 1995.

Figure 6 displays the distribution of cedar siding installation by home price ranges on a square foot basis in 1994 and 1995. This figure clearly indicates that while cedar siding was being installed rather haphazardly across home price ranges in 1994, in 1995 there was a definite positive relationship between the installation of cedar and home price range. This result is encouraging in that it indicates that cedar is being used more often on higher-end homes. Higher-end homes would presumably use a higher grade siding product than a lower-end home, and as a result the marginal return to manufacturers should be somewhat greater. Figure 7 displays the market share of cedar siding by home price ranges on a square foot basis in 1994 and 1995. This figure indicates that cedar siding's market share has declined across all home price ranges, especially in the $100,000 to $149,000 price range. Some of cedar's market share decline in the lower price ranges of homes can likely be attributed to the overall instability in the siding market in the Puget Sound region and higher cedar siding prices relative to the previous year. Note that because of the rapid decline in OSB siding's market share it will likely take at least a year or two for the market to correct itself and stabilize. It is speculated that some of cedar's market share decline in the upper price ranges of homes is simply due to sampling error in the survey. For example, the surveys' sampling error of 5% would make the 1994 and 1995 market shares in the upper price ranges of homes nearly equivalent. Consequently, the reader is strongly cautioned not to ascribe too much importance to cedar's market share across the home price ranges displayed in Table 11 and Figure 7. For all intents and purposes, the market shares of cedar in the $250,000-$400,000 and over $400,000 home price ranges are equivalent once sampling error is accounted for in the results.

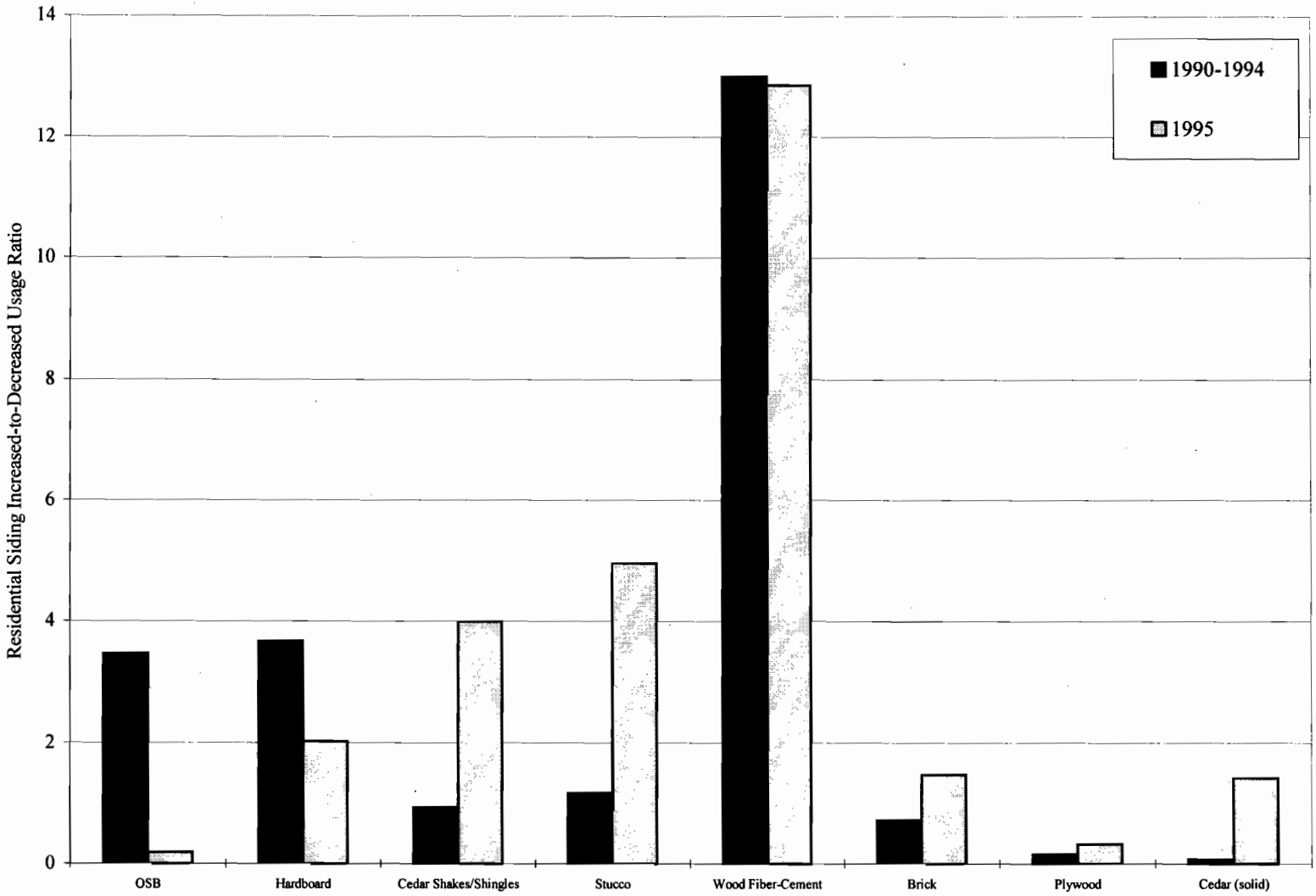

Figure 5. Usage ratios for various siding materials that firms have utilized, 1990-1994 and 1995.

Note: Calculated as the percentage of firms increasing their usage of the material divided by the percentage of firms decreasing their usage of the material. A number greater than 1 indicates that the installation of the siding material has generally increased among firms. Conversely, a number less than 1 indicates that the installation of the siding material has generally decreased among firms.

Table 10. Percent of solid cedar siding installed by average price range of homes firm builds.

Solid Cedar Siding Installed (ft^2)	Firms Installing Solid Cedar by Average Home Price (percent)[a]											
	Total		$100,000 - $149,999		$150,000 - $199,999		$200,000 - $249,999		$250,000 - $400,000		Over $400,000	
	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
None	63.6	66.7	14.6	16.7	16.4	20.1	18.2	16.7	12.7	8.3	1.8	4.2
1-2,499	5.5	10.4	0.0	2.1	3.6	6.3	1.8	1.8	0.0	0.0	0.0	0.0
2,500-4,999	12.7	6.3	5.5	0.0	5.5	4.2	0.0	0.0	0.0	1.8	1.8	0.0
5,000-7,499	1.8	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8
7,500-9,999	3.6	2.1	0.0	0.0	0.0	1.8	1.8	0.0	1.8	0.0	0.0	0.0
10,000-24,999	1.8	8.3	0.0	2.1	1.8	0.0	0.0	0.0	0.0	4.2	0.0	1.8
25,000-50,000	5.5	4.2	1.8	0.0	0.0	0.0	1.8	1.8	1.8	0.0	0.0	1.8
> 50,000	5.5	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0

[a] Data represents information provided in 1995 survey by 55 firms and 1996 survey by 48 firms.

Table 11. Solid cedar siding installed segmented by the average price range of homes firm builds.

Solid Cedar Siding Installed (ft^2)		Total	$100,000 - $149,999	$150,000 - $199,999	$200,000 - $249,999	$250,000 - $400,000	Over $400,000
Total square foot area of cedar installed							
	1994	459,655	113,850	38,625	110,680	50,750	145,750
	1995	173,142	24,000	21,617	26,400	35,125	66,000
As a percent of all cedar installed							
	1994	100.0%	24.8%	8.4%	24.1%	11.0%	31.7%
	1995	100.0%	13.9%	12.5%	15.3%	20.3%	38.0%
As a percent of all siding types installed							
	1994	12.5%	14.0%	6.8%	7.4%	9.4%	57.2%
	1995	6.3%	4.8%	2.6%	3.7%	6.4%	46.1%
Total number of firms installing cedar							
	1994	20	5	6	3	3	3
	1995	17	2	6	2	3	4
Percent of firms installing cedar							
	1994	36.4%	9.1%	10.9%	5.5%	5.5%	5.5%
	1995	35.4%	4.2%	12.5%	4.2%	6.3%	8.3%

[a] Data represents information provided in 1995 survey by 55 firms and 1996 survey by 48 firms.

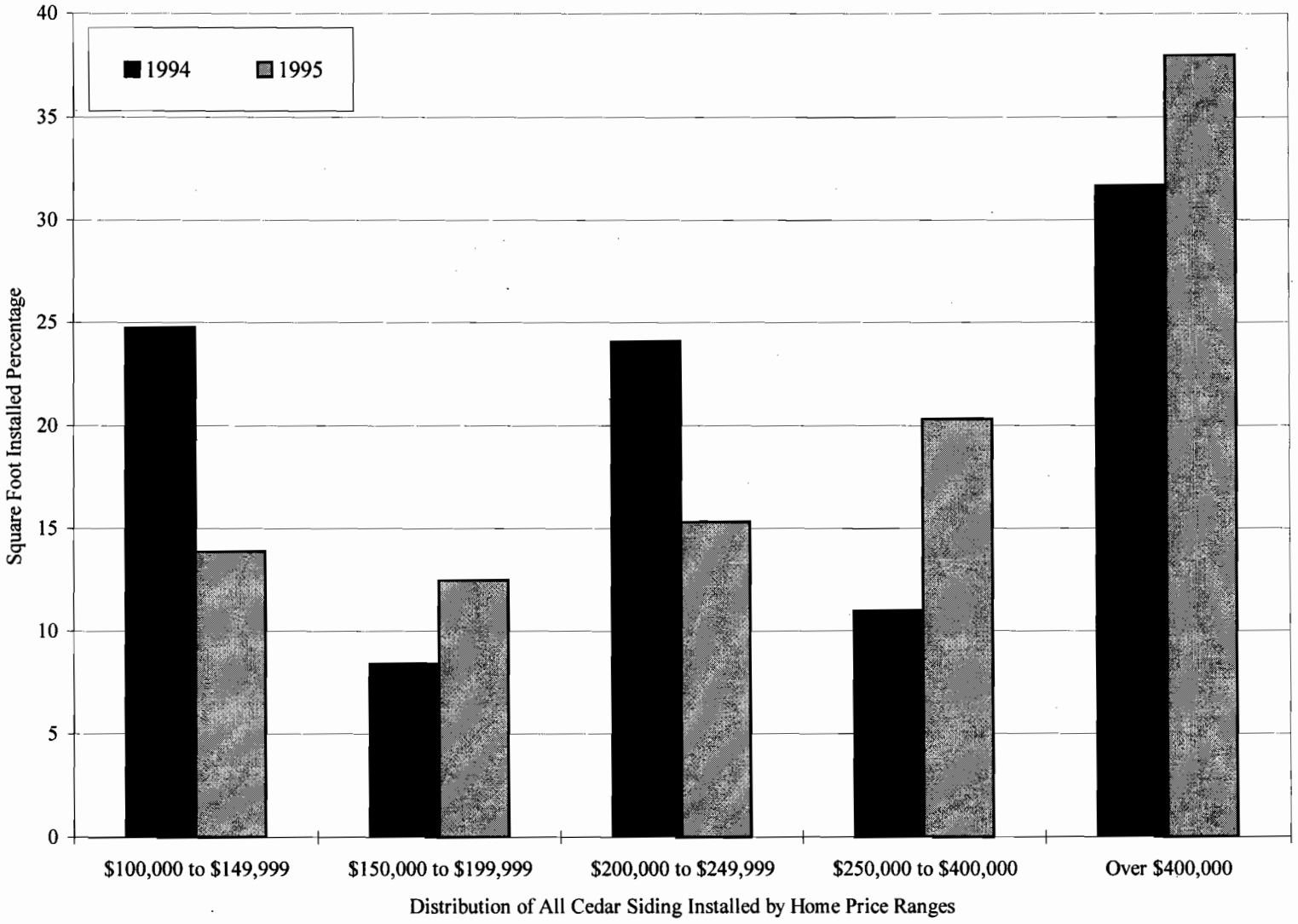

Figure 6. Distribution of cedar siding installation by home price ranges on a square foot basis, 1994 and 1995.

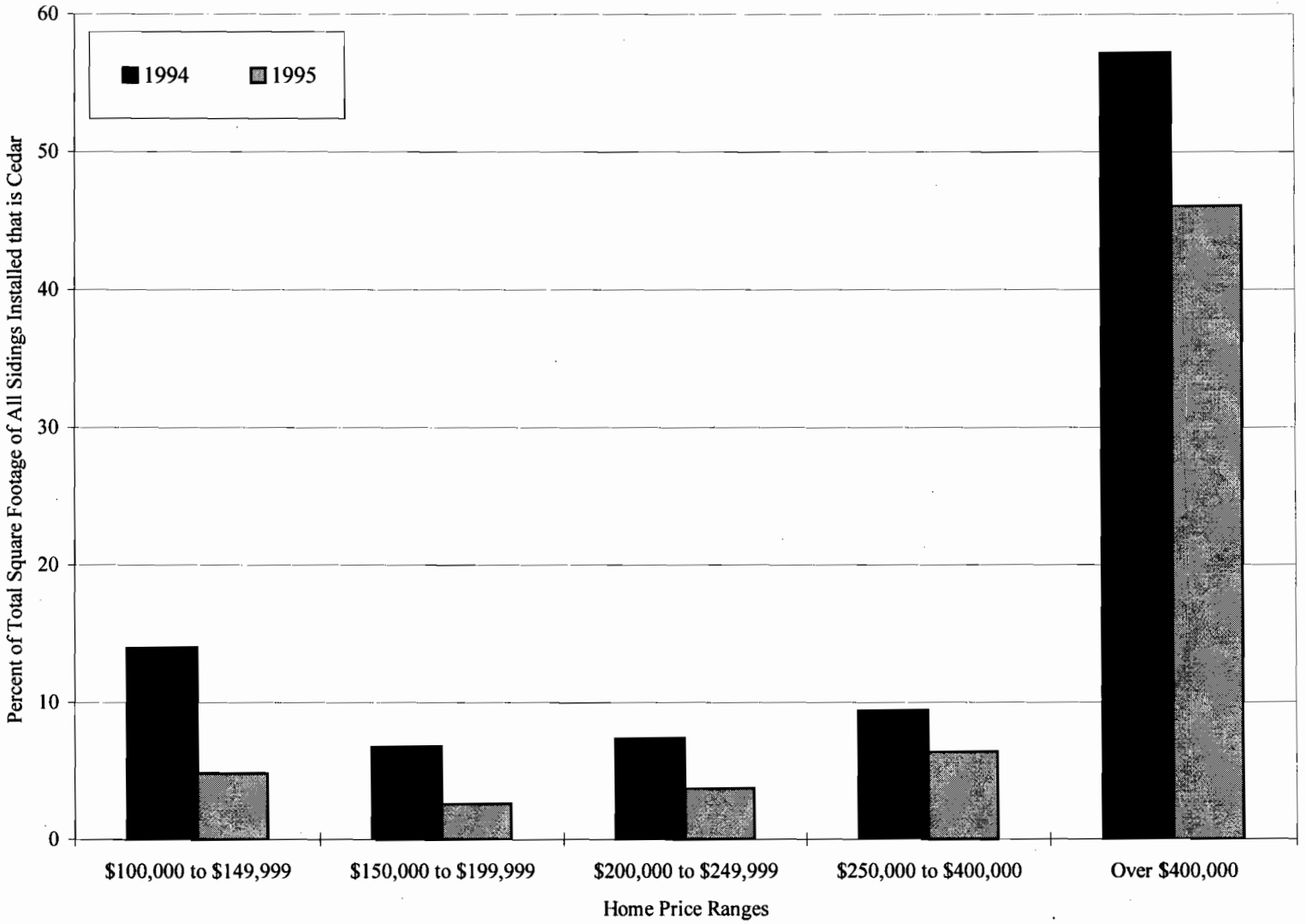

Figure 7. Market share of cedar siding by home price ranges on a square foot basis, 1994 and 1995.

Firms were asked to indicate what siding material(s) they felt would be the most appropriate for new homes within six different price categories in both the 1995 and 1996 surveys. A summary of the responses for the 1995 survey are displayed in Table 12 while presents the results obtained from the 1996 survey. For new lower-end homes priced below $150,000, the predominant siding materials identified by respondents were OSB, plywood, hardboard, and vinyl. According to the 1996 survey results, builders indicated that they would favor the use of OSB, solid cedar, cedar shakes and shingles, stucco, and brick sidings for new mid-range homes, priced between $150,000 and $250,000. Meanwhile, for new higher-end homes, priced over $250,000, builders indicated that they were inclined to use brick, stucco, solid cedar, and cedar shakes and shingles siding materials.

Figure 8 displays builder preferences for cedar, OSB, and wood-fiber cement siding materials by home price range as found in the analysis of the 1995 and 1996 survey data. These results indicate that there was a small but substantial increase in the number of builders that perceived cedar siding to be appropriate for installation on homes priced above $200,000. The results also indicate a decline in the number of builders that perceive OSB to be an appropriate siding material across all price ranges except the "under $100,000" price range, where OSB held steady across the two survey periods. Finally, Figure 8 reveals that from 1995 to 1996 there was a substantial increase in the acceptance of wood-fiber cement as a residential siding material across all home price ranges.

Table 12. Siding material that firms indicated would be most appropriate for new homes in six price ranges, 1995 survey results.

	Percent of Firms Indicating Siding Material is Appropriate for Use on New Homes in the Price Range of[a]					
Siding Material	**Under $100K**	**$100,000 - $149,999**	**$150,000 - $199,999**	**$200,000 - $249,999K**	**$250,000 - $400,000**	**Over $400K**
Brick	3.0	7.3	26.0	52.1	65.6	69.8
Stucco	--	--	5.2	34.4	68.8	67.7
Cedar (solid)	2.1	10.4	28.1	42.7	49.0	47.9
Cedar Shakes/Shingles	1.0	1.0	18.8	36.5	41.7	38.5
OSB	49.0	66.7	61.5	56.3	37.5	25.0
Redwood (solid)	--	2.1	2.1	8.3	20.8	24.0
Wood Fiber-Cement	11.5	17.7	20.8	22.9	14.6	11.5
Hardboard	29.1	29.1	22.9	18.8	12.5	10.4
Spruce (solid)	2.1	7.3	9.4	7.3	5.2	6.3
Vinyl	22.9	27.1	16.7	8.3	3.0	4.2
Plywood	51.0	38.5	13.5	4.2	2.1	1.0
Aluminum	11.5	10.4	2.1	2.1	1.0	1.0

[a] Based on the responses of 96 firms.

Builder Exposure to WRCLA Promotional Campaign

One purpose of the follow-up survey was to examine the influence that the WRCLA promotional strategy had on builder perceptions of residential siding materials. The survey participants were specifically asked how many times over the past year (October 1995 through October 1996) that they could recall seeing *any* newspaper or magazine advertisement depicting western red cedar siding. Approximately 70% of the respondents indicated they had seen a western red cedar print advertisement at least once over the past year. Over one-half of the respondents indicated that they had seen a western red cedar print advertisement at least twice over the past year, as indicated in Table 14.

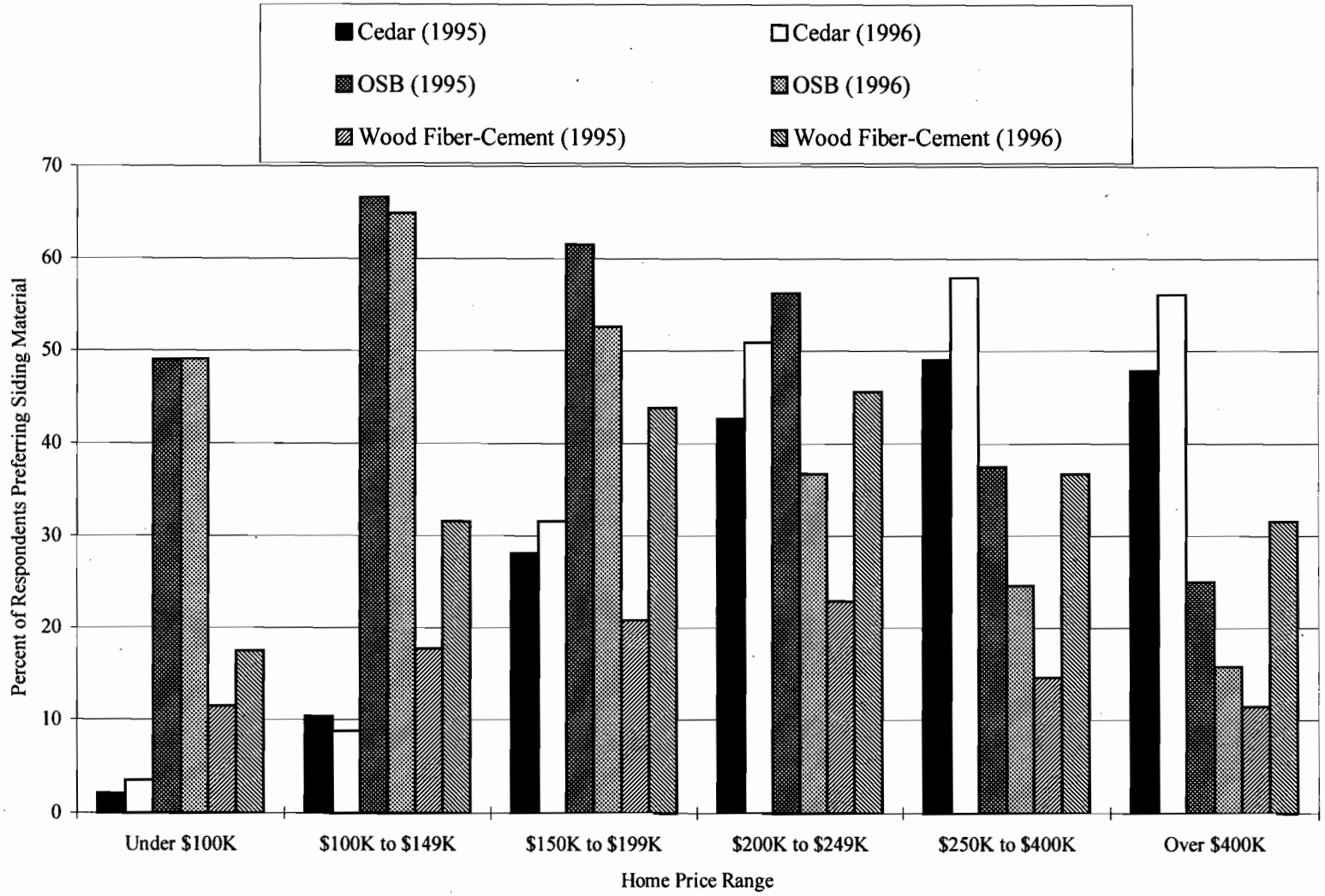

Figure 8. Changes in builder preferences for selected siding materials in various new home price ranges between 1995 and 1996.

Table 13. Siding material that firms indicated would be most appropriate for new homes in six price ranges, 1996 survey results.

Siding Material	Percent of Firms Indicating Siding Material is Appropriate for Use on New Homes in the Price Range of[a]					
	Under $100K	$100,000 - $149,999	$150,000 - $199,999	$200,000 - $249,999K	$250,000 - $400,000	Over $400K
Brick	1.8	1.8	19.3	52.6	70.2	78.9
Stucco	--	--	8.8	35.1	66.7	75.4
Cedar (solid)	3.5	8.8	31.6	50.9	57.9	56.1
Cedar Shakes/Shingles	--	5.3	21.1	45.6	54.4	47.4
OSB	49.1	64.9	52.6	36.8	24.6	15.8
Redwood (solid)	--	--	7.0	14.0	19.3	24.6
Wood Fiber-Cement	17.5	31.6	43.9	45.6	36.8	31.6
Hardboard	19.3	24.6	17.5	10.5	5.3	3.5
Spruce (solid)	1.8	3.5	10.5	8.8	10.5	10.5
Vinyl	19.3	26.3	22.8	17.5	3.5	1.8
Plywood	52.6	40.4	14.0	3.5	--	--
Aluminum	7.0	3.5	7.0	5.3	3.5	5.3

[a] Based on the responses of 57 firms.

Table 14. Survey respondents' western red cedar print advertisement recall frequency.

Frequency that Respondents Recalled Seeing a Print Advertisement for Western Red Cedar Siding	Percent of Respondents[a]	Cumulative Percent of Respondents
Five Times or More	14.3	14.3
Three or Four Times	33.9	48.2
Twice	5.4	53.6
Once	16.1	69.7
Never	30.3	100.0

[a] Based on a total of 56 responses.

Survey participants who indicated that they had seen western red cedar print advertisements were also asked whether the advertising had any influence on their future purchasing decisions. Nineteen percent of the respondents indicated that the advertisements did influence their future western red cedar purchasing decisions. Given these results, it is estimated that the western red cedar print advertising program influenced the purchasing decision of approximately 12.5% of all consumers of western red cedar siding in the Puget Sound market over the one-year promotional campaign, which is a very high percentage for any industrial product promotional campaign. Given the nature of the WRCLA advertisements, it was assumed that they had a positive influence on the respondents' purchasing decision.

Low Advertising Exposure Versus High Advertising Exposure Analysis

An assessment was made to determine the differences in the responses of survey participants based on their levels of exposure to the WRCLA print advertising campaign. The first assessment consisted of categorizing survey respondents into one of two groups; specifically, those respondents who indicated that they had seen WRCLA print advertisements three of more times over the past year were categorized into a *high advertising exposure* group (HAE), while the remaining survey respondents (*i.e.*, those who saw WRCLA print advertisements less than three times over the past year) were categorized into a *low advertising exposure* group (LAE).

Table 15 displays the differences between HAE and LAE respondents along the 12 product attributes that were analyzed in the 1996 survey for cedar siding. HAE respondents perceived that cedar siding possessed a greater degree of nine of the 12 product attributes relative to LAE respondents. These product attributes were competitive price, beautiful appearance, high status and quality image, high durability, wide color selection, variety of textures and profiles, fade resistance, dimensional stability, and high consistency and uniformity. Only one of these eight product attributes, however, was significantly different between HAE and LAE groups; namely, HAE respondents perceived that cedar siding possessed a significantly greater color selection than LAE respondents.

Table 15. Western red cedar product attribute differences between low advertising exposure and high advertising exposure groups, 1996 survey results.

Western Red Cedar Product Attribute	Western Red Cedar Product Attribute Mean Scores[a]		Significant Difference and Direction[b]
	Low Advertising Exposure	High Advertising Exposure	
Competitive Price	2.21	2.33	↑
Easy/Low Cost Maintenance	2.29	2.05	↓
Fast/Easy Installation	2.71	2.38	↓
Impact/Dent Resistance	2.86	2.62	↓
Beautiful Appearance	3.21	3.33	↑
High Status and Quality Image	3.36	3.10	↓
High Durability	2.71	2.95	↑
Wide Color Selection	1.93	2.76	❖↑
Variety of Textures/Profiles	2.00	2.33	↑
Fade Resistance	1.79	2.19	↑
Dimensional Stability	2.29	2.43	↑
High Consistency/Uniformity	2.29	2.43	↑

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] The ❖ symbol indicates that there was a significant difference between the low advertising exposure and high advertising exposure groups when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the differences from low advertising exposure to high advertising exposure.

No Advertising Exposure Versus Advertising Exposure Analysis

Another assessment was made to determine the differences in the responses of survey participants based on whether they were exposed at all to the WRCLA print advertising campaign. This assessment also consisted of categorizing survey respondents into one of two groups; specifically, those respondents who indicated that they had never seen WRCLA print advertisements over the past year were categorized into a *no advertising exposure* group (NAE), while the remaining survey respondents (*i.e.*, those who saw at least one WRCLA print advertisements over the past year) were categorized into a *advertising exposure* group (AE).

Table 16 displays the differences between NAE and AE respondents with respect to the 12 products attributes that were analyzed in the 1996 survey for cedar siding. AE respondents perceived that cedar siding possessed a greater degree of 10 of the 12 product attributes relative to NAE respondents. These product attributes were competitive price, easy and low cost maintenance, beautiful appearance, high status and quality image, high durability, wide color selection, variety of textures and profiles, fade resistance, dimensional stability, and high consistency and uniformity. Three of these 10 product attributes that were found to be significantly different between the AE and NAE groups. Specifically, the AE respondents perceived that cedar siding possessed significantly greater durability, a wider variety of textures and profiles, and greater fade resistance than did NAE respondents.

An examination of the statistically significant differences between the AE and NAE groups on the basis of respondents' perceptions of how important it is that a siding material possess a specific product attribute is shown in Table 17. There were several significant differences between the AE and NAE groups in how they perceived the

Table 16. Western red cedar product attribute differences between respondents exposed and unexposed to WRCLA print advertising, 1996 survey results.

Western Red Cedar Product Attribute	Western Red Cedar Product Attribute Mean Scores[a]		Significant Difference and Direction[b]
	No Advertising Exposure	Exposed to Advertising	
Competitive Price	2.06	2.24	↑
Easy/Low Cost Maintenance	3.25	3.74	↑
Fast/Easy Installation	2.76	2.49	↓
Impact/Dent Resistance	2.71	2.56	↓
Beautiful Appearance	3.18	3.30	↑
High Status and Quality Image	3.00	3.21	↑
High Durability	2.47	2.89	❖↑
Wide Color Selection	2.35	2.81	↑
Variety of Textures/Profiles	1.88	2.38	❖↑
Fade Resistance	1.75	2.22	❖↑
Dimensional Stability	2.29	2.32	↑
High Consistency/Uniformity	2.31	2.32	↑

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] The ❖ symbol indicates that there was a significant difference between group not exposed to print advertising and group exposed to print advertising when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the differences from no exposure to exposed groups.

importance of several siding attributes. The AE group perceived that the product attributes of impact and dent resistance, beautiful appearance, variety of textures and profiles, fade resistance, dimensional stability, thermal insulation, structural strength, mold and mildew resistance, and fire resistance were more important in their purchase decision than did the NAE group. This result is interesting in that it suggests that the NAE group is relatively indifferent to the product attributes that differentiate between the siding materials from which they can choose. Furthermore, it also suggests that those respondents that are exposed to print advertising campaigns acquire a heightened awareness of the product attributes that differentiate siding materials other than the generic physical product itself.

Perceptual Changes in Western Red Cedar Quality

An assessment of western red cedar siding material quality was also made in the follow-up survey. Survey participants were asked whether they had noticed any change in the overall quality of western red cedar siding being offered in the market over the past 18 months. Twenty-three percent of the respondents indicated that they had seen a change in western red cedar siding quality. Nearly 9% of all respondents indicated that western red cedar siding quality had decreased, while slightly over 14% indicated that the quality had improved.

Effect of Louisiana-Pacific Corporation OSB Problems

Individuals who are knowledgeable about the residential siding market are generally aware of the problems that Louisiana-Pacific Corporation has experienced over the past few years with their OSB siding product Inner-Seal®. It was hypothesized that the problems associated with OSB siding may have enhanced western red cedar siding's relative position in the Puget Sound market, especially since much of the controversy surrounding Louisiana-Pacific Corporation's OSB siding problems centered in this market. The follow-up survey attempted to determine the extent that residential contractors were aware of OSB siding problems, as well as the impact that these problems had on their siding purchase decisions. The survey specifically asked the participants to indicate if they were aware of the

Table 17. Statistically significant differences in *Importance* scores between no advertising exposure and advertising exposure groups, 1996 survey results.

	Product Attribute Mean Scores	
	No Advertising Exposure	**Advertising Exposure**
***Importance that Material Possesses Product Attribute*:**[a]		
Impact and Dent Resistance	2.69	3.15
Beautiful Appearance	3.63	4.05
Variety of Textures and Profiles	2.19	2.89
Fade Resistance	2.63	3.16
Dimensional Stability	3.38	3.82
Thermal Insulation	1.75	2.32
Structural Strength	2.00	2.68
Mold and Mildew Resistance	3.19	3.82
Fire Resistance	2.13	2.68

[a] Mean score is based on a five-point Likert scale in which the importance that the siding materials possess the attribute is 1="Not Important At All," 2="Of Little Importance," 3="Important," 4="Very Important," and 5="Of Critical Importance."

problems associated with OSB siding over the past two years (*e.g.*, delamination, fungal growth). The survey also requested that if the participant was aware of the problems associated with OSB siding to specify how these problems impacted their residential siding purchasing decisions. The results reveal that 96.5% of the respondents were aware of the OSB problems (Figure 9). Furthermore, 73.7% of all respondents indicated that the problems with OSB siding materials impacted their purchasing decisions. Although the survey did not specifically ask whether the problems associated with OSB impacted consumer purchasing decisions positively or negatively, it was assumed that it would have had a negative effect.

Determinant Attribute Analysis

Determinant Attribute Theory

Extensive research has been performed examining how individual attitudes can be measured. One out-growth of this research has been the development of multi-attribute attitude models that are used to measure consumers' attitudes (Wilkie and Pessemier, 1973). As Stalling (1988, p.61) points out, "*underlying these models is the assumption that the consumers view products as bundles of attributes, features, or benefits, and that the attributes differ in their contribution to* [final] *product evaluation and choice.*" Attributes that influence consumer choice are called "determinant" (Myers and Alpert, 1968). While a particular attribute may be important to the consumer, if the consumer feels that other products are equal with regard to that attribute, then the attribute is not considered a determinant factor in the purchase decision. Therefore, determinant attributes can be thought of as attributes that influence a consumer's purchase decision, as well as those attributes that differentiate between a set of competing products.

Determinant Attribute Methodology

A dual question methodology was utilized in this analysis to identify the determinant attributes used by consumers of residential siding materials in making their purchase decision. The dual question method required the respondents to rate attributes in terms of how important each is in determining product choice and how much of a difference is perceived to exist among competing products with regard to each attribute. Each survey respondent was asked to indicate the importance of 25 siding attributes using a Likert scale anchored on 1 = "Not Important At All" to 5 = "Of Critical Importance." Afterward, respondents were asked to indicate the extent to which each of the competing residential siding products differed with respect to these attributes. Differences were measured on a Likert scale anchored on 1 = "Very Similar" to 4 = "Very Different."

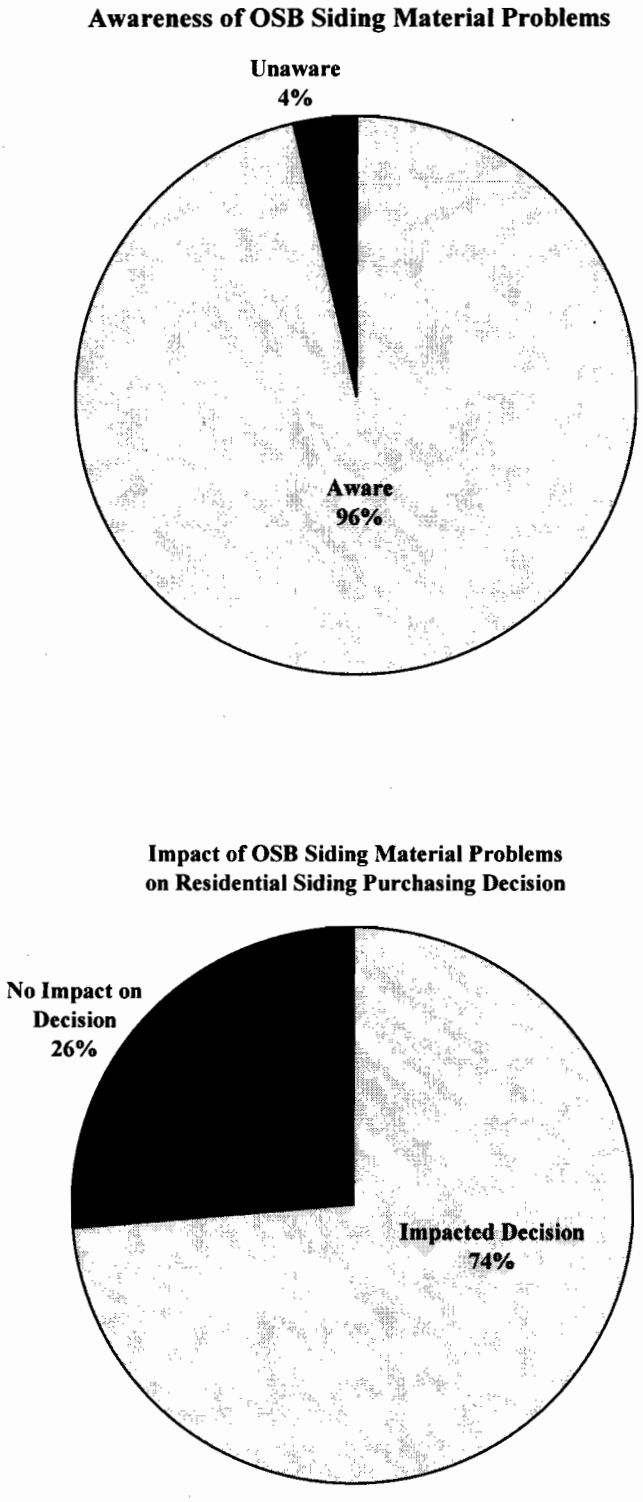

Figure 9. Awareness of OSB siding material problems and the influence of these problems on siding material purchasing decisions.

The determinance score for each product attribute was calculated by weighting the importance of a given attribute by the perceived difference for that attribute. For example, if x represents the importance rating and y the difference rating of a particular attribute provided by a survey respondent, then xy represents the "degree of determinance" for the given attribute and respondent. The determinance scores range from 1 to 20 since attribute importance was measured on a five-point scale while attribute difference was measured on a four-point scale.

In determinant attribute analysis, attributes are examined to determine those which are best able to differentiate between a set of products. Since individual respondents use the scales differently (for example, some respondents may respond using only the upper end of the scales where others will typically answer using the lower-end of the scales), the scores for each respondent were standardized (T-score). As a result, the determinance scores for each individual respondent had a mean of 50 and a standard deviation of 10.

Algebraically, the determinance score can be calculated as follows:

$$D_i = 10((P_iI_i - X) / s) + 50$$

Where	D_i	= Determinance score for attribute i
	P_i	= Perceived difference between siding materials along attribute i
	I_i	= Importance of attribute i
	X	= Respondent's grand determinance mean, or the sum of all $(P_i)(I_i)$ divided by 25
	s	= Standard deviation of X
	10 and 50	= Z-score to T-score conversion factors

An attribute is considered to be determinant if a one-tailed Z-test finds that the attribute is significantly greater than the mean. The population mean and standard deviation are approximated using the grand mean and standard deviation from the survey sample. This method, developed by Alpert (1971), has been proven in numerous market research studies.

Results of Determinant Attribute Analysis and Importance Ratings

A profile of the average determinance score results for all survey respondents along the 25 attributes is displayed in Figure 10 for the first survey and in Figure 11 for the follow-up survey. Thirteen of the 25 attributes were found to have means significantly greater than the grand mean of 50 in the initial survey, while the follow-up survey results indicated that 12 attributes had mean scores that were significantly greater than the grand mean of 50. Only those attributes with determinance scores greater than 50 should be considered "determinant." These determinant attributes are the product attributes that differentiate between residential siding materials.

Comparison of the initial and follow-up surveys' determinant attribute analyses reveals that the top three differentiating attributes that were found in the initial survey (competitive price, beautiful appearance, high status and quality image) were the same top three in the follow-up survey. Note, however, that these three attributes were found to be even more powerful in differentiating siding products from one another in the follow-up survey than they were in the initial survey. Specifically, the average determinance scores for the competitive price and beautiful appearance attributes increased by nearly a full point. Furthermore, the high status and quality image attribute experienced the largest positive net change, increasing by more than two points. These results imply that the siding attributes of competitive price, beautiful appearance, and high status and quality image have increased in their relative significance in differentiating between siding products. Moreover, their increase suggests that consumers of siding products are focusing on these three attributes as the primary "bundle of attributes" that will define their siding purchase decision.

A better understanding of determinant attribute analysis is possible by comparing Figure 10 against Figure 12 and Figure 11 against Figure 13. Figure 12 displays the average *importance* scores as reported by all respondents for each of the 25 residential siding attributes. As is evident from this comparison, determinance and importance do not readily coincide. For instance, the attribute of service from retailer received the seventh highest average importance score, but was ranked fifteenth in determinance score. In addition, service from retailer was not found to be

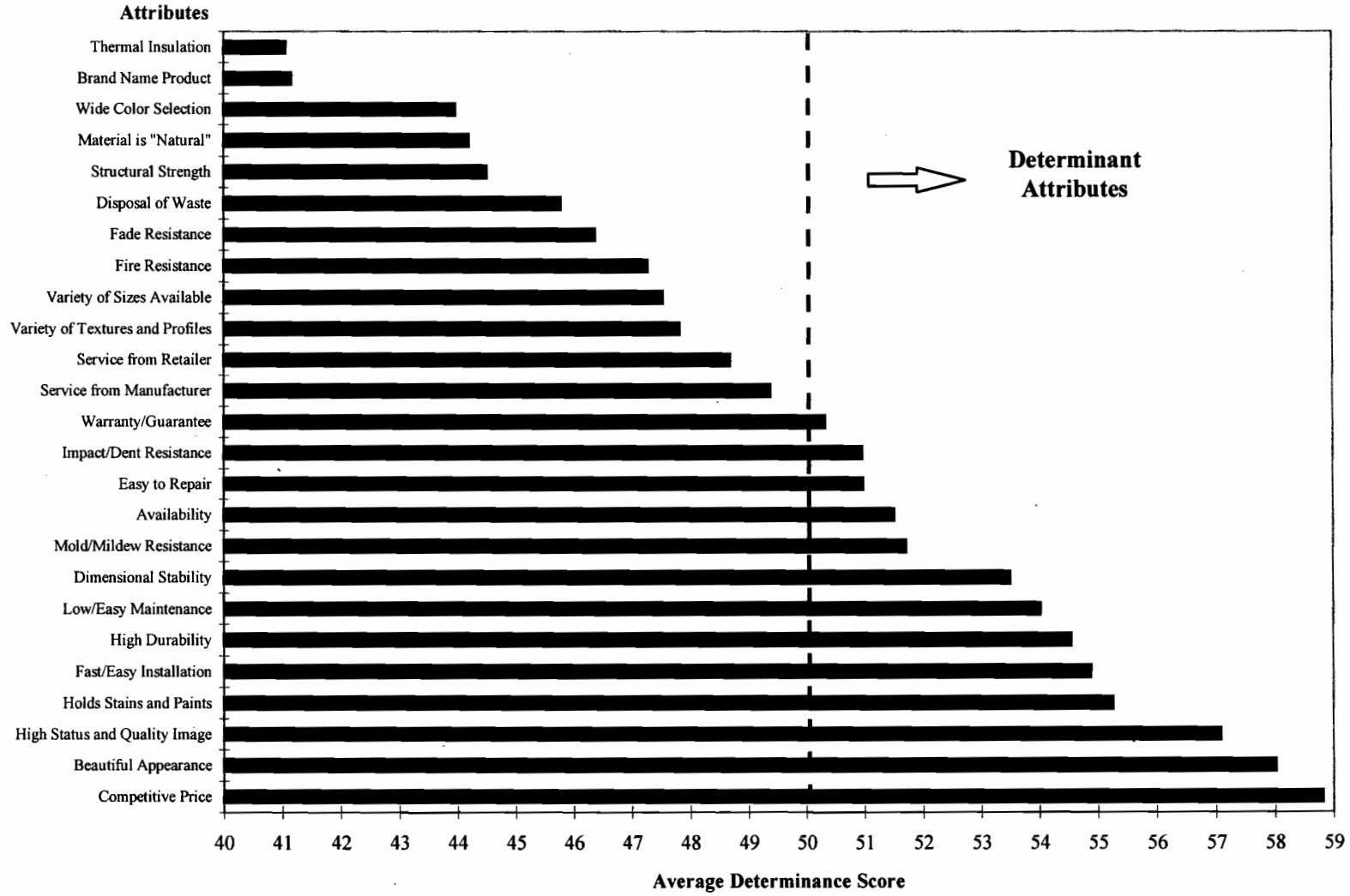

Figure 10. Average determinance score ratings for 25 residential siding attributes, 1995 survey results.

Note: Those attributes to the right of the dashed line are "determinant," and are significantly greater than the mean score of 50.

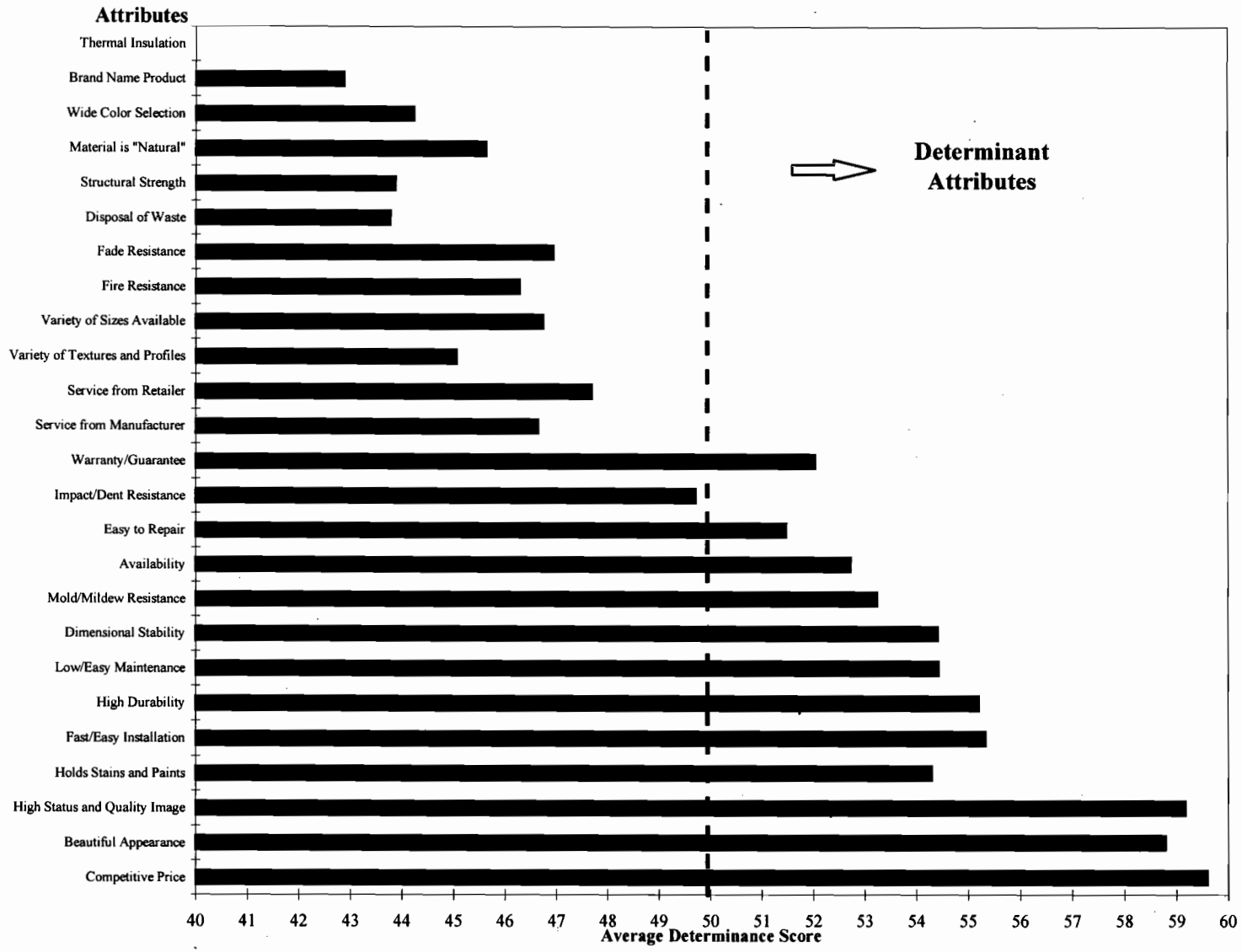

Figure 11. Average determinance score ratings for 25 residential siding attributes, 1996 survey results.

Note: Those attributes to the right of the dashed line are "determinant," and are significantly greater than the mean score of 50.

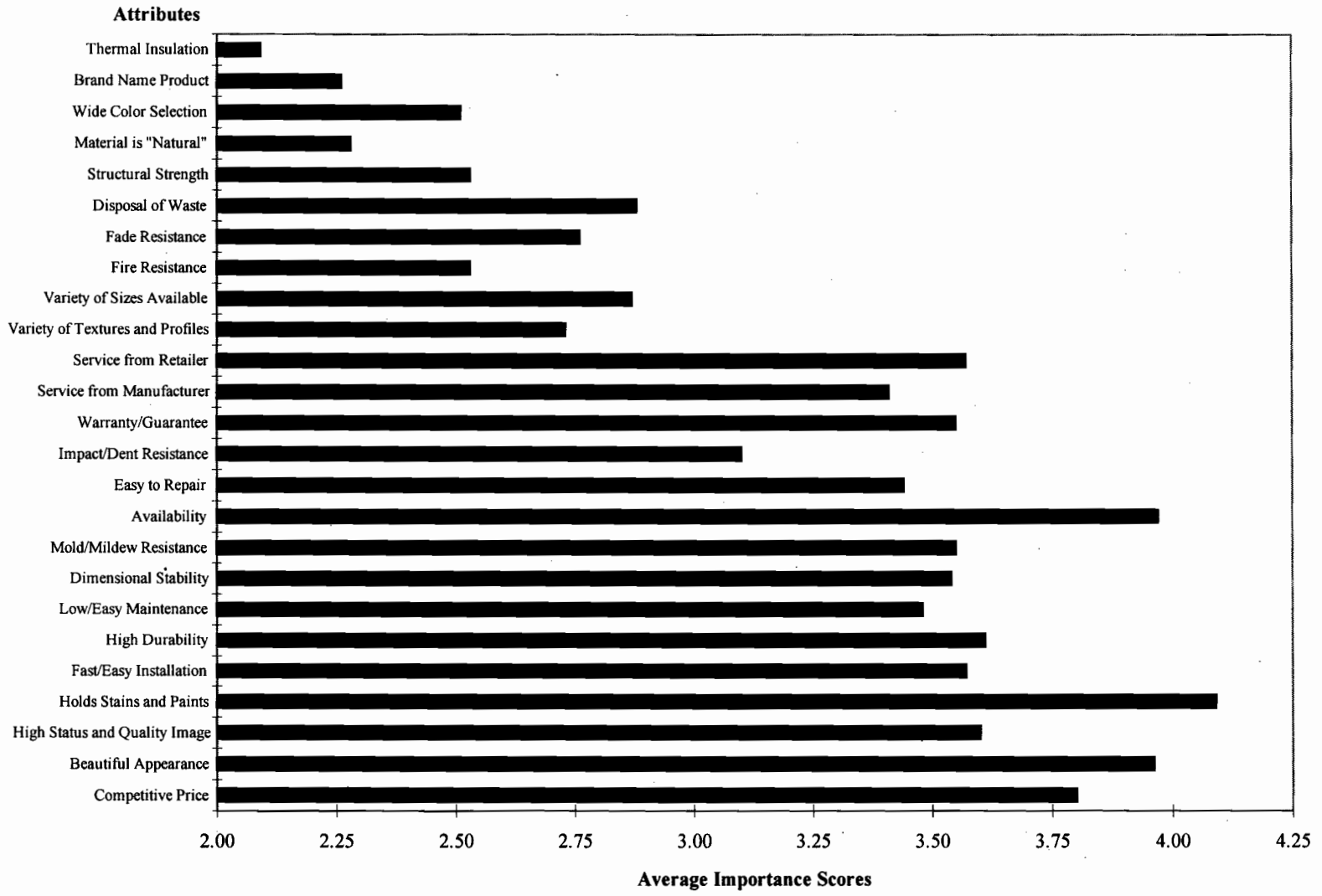

Figure 12. Average importance ratings for 25 residential siding attributes, 1995 survey results.

Note: Attribute importance scores are arranged in the ascending order of their determinance scores to allow for direct comparison with Figure 10.

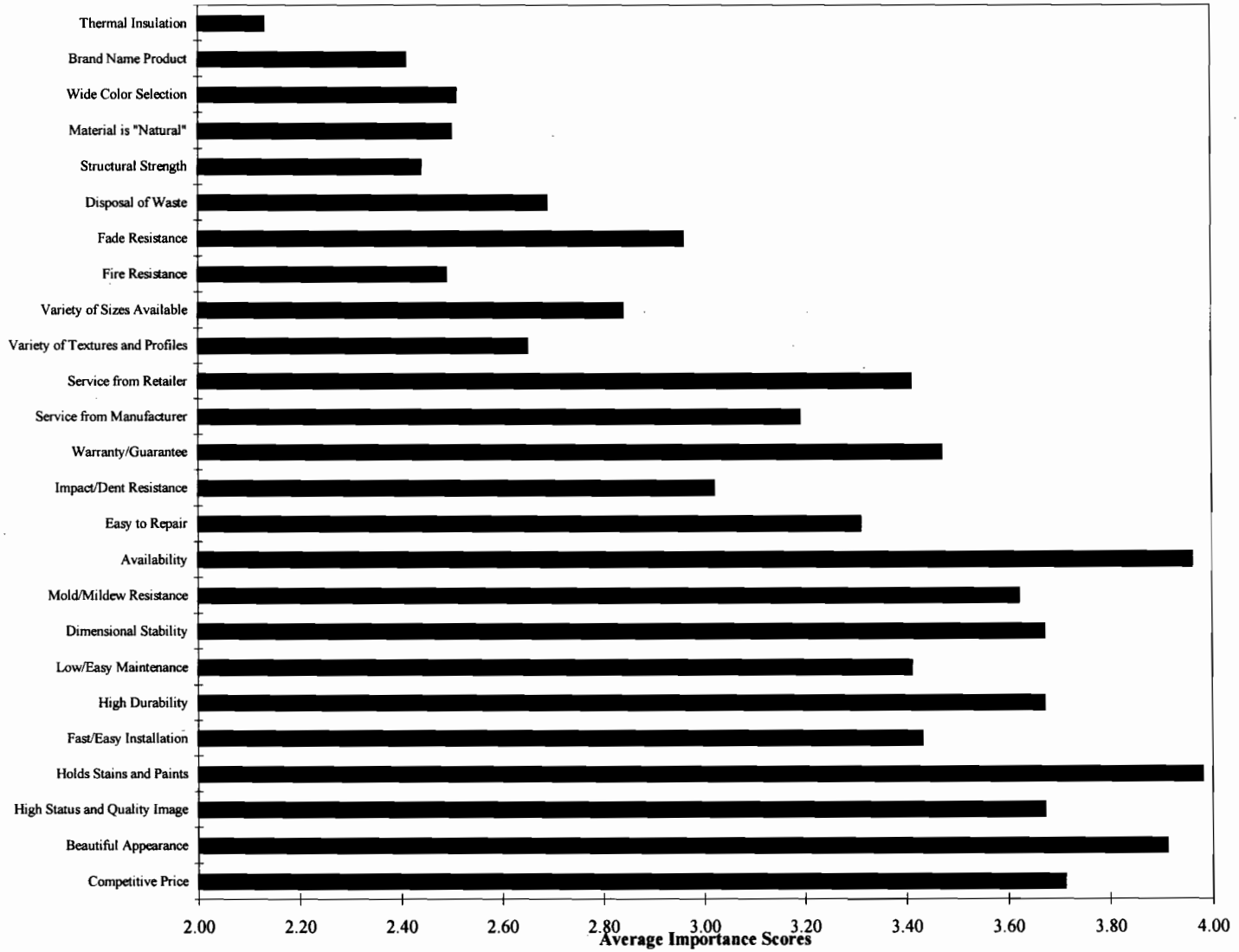

Figure 13. Average importance ratings for 25 residential siding attributes, 1996 survey results.

Note: Attribute importance scores are arranged in the ascending order of their determinance scores to allow for direct comparison with Figure 11.

statistically determinant. Interestingly, the attribute of availability was found to have the second highest average importance score among the 25 residential siding attributes, but was ranked tenth in determinance score (it was a determinant attribute, however). This comparative example clearly illustrates an interpretation problem that exists in traditional market research when simply evaluating the importance that respondents place on a range of product attributes. The importance rating for availability suggests that this attribute is extremely important in defining how builders evaluate siding products against one another. The differences that builders perceive in availability among the siding products are minimal, however, indicating that builders are unlikely to base a substantial amount of their purchase decision on this attribute. Rather than purchasing a siding product that is available, it is more likely that the builder would seek out the preferred unavailable product elsewhere (*e.g.*, another wholesaler or retailer).

A summary of the six largest positive and negative net changes in the average determinance score from the results of the 1995 and 1996 surveys is presented in Figure 14. Attributes that were found to be decreasing the most in their relative importance in differentiating between residential siding materials were variety of textures and profiles, service from manufacturer, disposal of waste, impact and dent resistance, thermal insulation, and service from retailer. In essence, these results suggest that there is increasing parity in these attributes across the various siding products. Of particular interest is the fact that consumers of residential siding materials see a decreasing difference between the service from retailers and manufacturers of various residential siding materials. The attributes that were found to be increasing the most in their relative importance in differentiating between residential siding materials were product availability, natural material, mold and mildew resistance, warranty or guarantee, brand name product, and high status and quality image.

Strategic Ramifications of Determinant Attribute Results

The determinant attribute analyses identified 13 and 12 residential siding attributes out of the 25 as being significant in the 1995 and 1996 survey results, respectively. These determinant attributes should be given considerable weight in the formulation and execution of any marketing strategy. The analysis indicates that competitive price should be emphasized in the promotion of cedar siding, but only in relation to other siding products which have similar beauty, high status, and quality image characteristics. In addition, cedar siding's installation, durability, maintenance, and dimensional stability attributes should be emphasized to some extent in promotional efforts. How these attributes are emphasized, however, is contingent on how builders currently perceive the siding products relative to one another. The identification of the determinant attributes allows for further investigation into how builders perceive each of the 12 residential siding products along the 13 determinant attributes (an analysis of builders' perceptions follows this section).

Some important points need to be made concerning the results of the 1995 and 1996 determinant attribute results. First, the results indicate that builders primarily differentiate between various residential siding materials based on the materials' competitive price, beautiful appearance, and high status and quality image characteristics. In fact, these three attributes clearly outweigh other material attributes in the differentiating ability between products.

Second, product warranty/guarantee, product availability, and brand name product characteristics significantly increased in their differentiating ability from 1995 to 1996. This suggests that some siding material manufacturers and suppliers may be emphasizing these product characteristics, heightening consumer awareness.

Perceptual Mapping Analysis

Foundations of Perceptual Mapping

Perceptual mapping, also known as multidimensional scaling (MDS), is a procedure used to determine the perceived image that an individual has regarding a set of products (Hair, Anderson, Tatham, and Black, 1992). The goal of perceptual mapping is to transform consumer judgments of similarities or preferences (*e.g.*, preference for residential siding materials) into distances that are represented in a multidimensional space. Suppose, for instance, OSB and plywood sidings are perceived by respondents as being most similar compared with all other possible pairs of residential siding materials. Perceptual mapping techniques will position OSB and plywood in such a way that the distance between the two sidings in multidimensional space will be shorter than the distance between any other pair of siding materials. Graphically, plot areas 1 and 5 in Figure 15 could represent OSB and plywood.

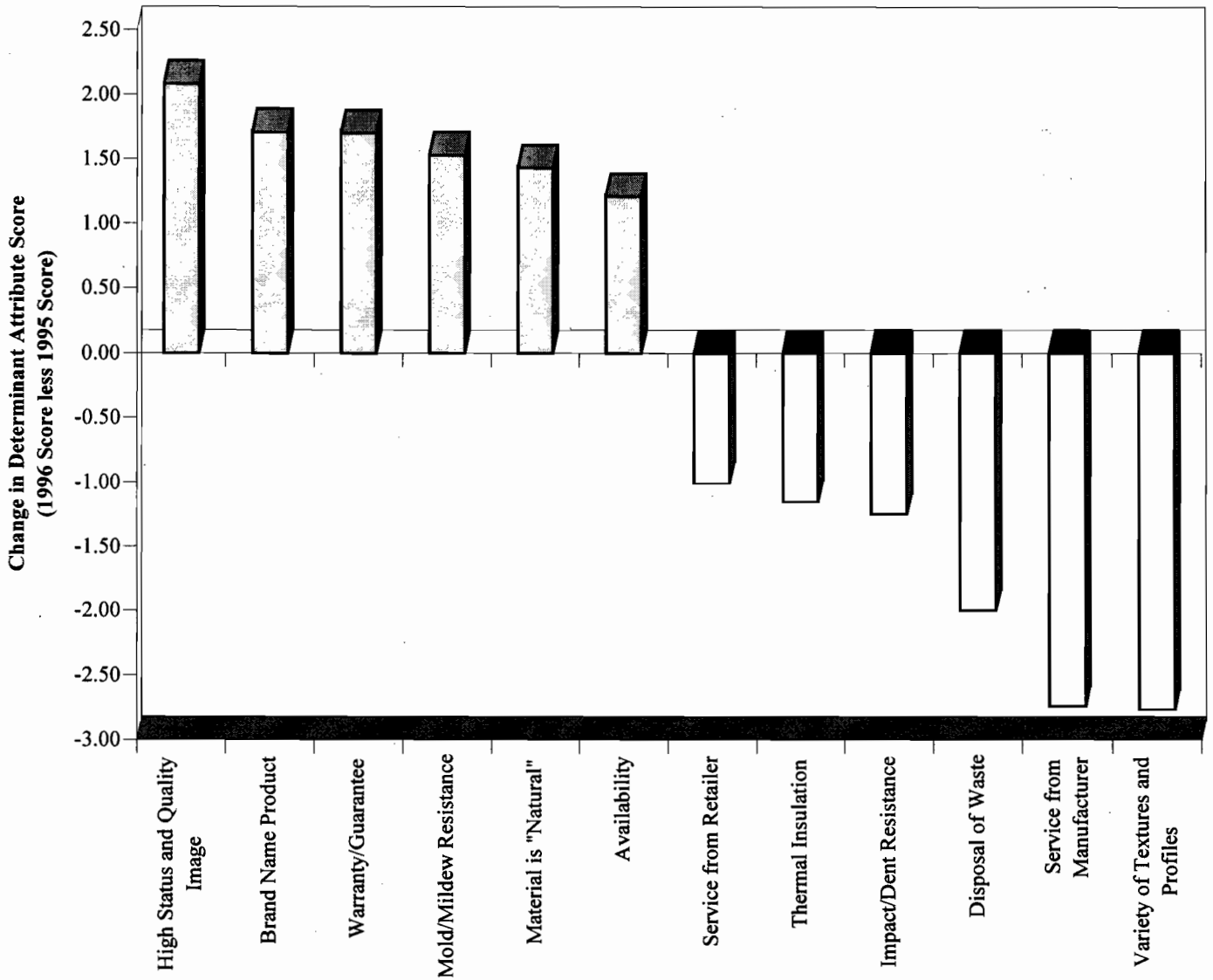

Figure 14. Determinant attributes exhibiting the greatest change between 1995 and 1996 survey results.

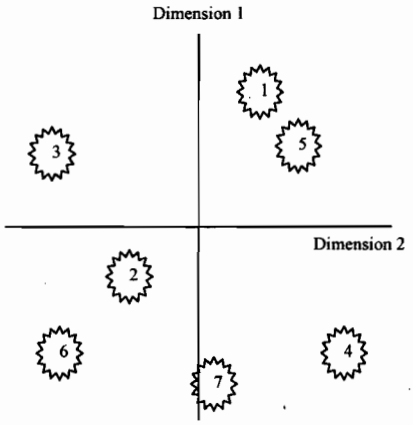

Figure 15. Example of a multidimensional map of perceptions for seven hypothetical industrial products along two dimensions.

Products such as residential siding materials can be thought of as possessing both perceived and objective dimensions. Objective dimensions are physical or tangible characteristics such as color, weight, or shape. Perceived dimensions are subjective characteristics that individuals attach to the object. Perceived dimensions would include such subjective characteristics as image, beauty, and value. It should be noted that in many cases perceived and objective dimensions do not correspond.

As Hair, *et al.* (1992) note, "*Perceptual mapping is most appropriate in two situations:* (1) *as an investigative technique to identify unrecognized dimensions affecting behavior, or* (2) *as a means of obtaining comparative evaluations of objects when the specific bases of comparison are unknown or undefinable.*" In this analysis of builders' perceptions, our goal was to make comparative evaluations of 12 residential siding materials so as to develop a more successful marketing strategy for solid cedar siding manufacturers, wholesalers, and retailers.

To make the perceptual maps pragmatically useful to managers, however, perceptions should be associated with the builders' general behavior or intended behavior. This linking of products to behavior is typically achieved by superimposing onto the perceptual map the "ideal point(s)." An ideal point represents that position in the dimensional space that the "ideal product" would occupy, assuming such a product existed. As Stalling (1988) indicates, the ideal points should serve as a reference point for the products being evaluated, indicating how much of an attribute is desired by the respondents, since increasing the amount of a given attribute does not necessarily equate to a better or improved product.

Perceptual Mapping Methodology

The compositional approach to perceptual mapping was performed in this analysis. Specifically, the compositional approach derives preference evaluations from a series of separate evaluations made by each of the respondents. These individual evaluations are then combined using a multivariate statistical technique called multiple discriminant analysis to form an overall evaluation. Multiple discriminant analysis provides an advantage in that it allows for the identification of differences among two or more market segments. In this analysis, 12 attribute ratings were used as the independent variables (predictor variable) and 12 residential siding materials represented the dependent variable. The 12 attributes included: competitive price, easy and low cost maintenance, fast and easy installation, resistance to impacts and denting, beautiful appearance, high status and quality image, high durability, wide color selection, variety of textures and profiles, fade resistance, dimensional stability, and high product consistency/uniformity.

A measure of each respondent's preferred product rating for each of six home price ranges was used as a proxy for the ideal points. If multiple preferences were indicated, then the average rating for each attribute was used.

Employing the functions derived from the discriminant analysis, the ideal points were fitted into the same multidimensional space as the products.

Results of 1995 Survey's Perceptual Mapping Analysis

Seventy builders rated all 12 residential siding materials on the 12 attributes. To determine which of the twelve attributes differentiated best between the various siding materials, a multiple discriminant analysis (MDA) was performed on the data. The analysis determined that seven functions were statistically significant. To increase the interpretability of the MDA results, a varimax rotation was also used in the analysis. The discriminant analysis reduced the 12 residential siding attributes to seven dimensions. Each of the dimensions can be described by a function that represents those attributes in which the siding materials differ the most. Each discriminant function represents a linear combination in which a discriminant score can be calculated for each of the respondents, which is very similar to a linear regression analysis. Examination of each of the attributes having the highest attribute loadings on the function allows for the interpretation and labeling of each of the functions.

The solution to the MDA can be plotted in a seven-dimensional space. However, to make interpretation of the results more understandable, three two-dimensional plots were constructed. The first plot is shown in Figure 16, where the high status image/beautiful appearance and fast and easy installation functions accounted for 50.1% of the total explained variance in the analysis. The second plot is shown in Figure 17, where the functions of impact/dent resistance and fade resistance accounted for 20.4% of the total explained variance. Finally, the third plot is shown in Figure 18, where the functions of easy/low cost maintenance and high product consistency and uniformity accounted for 17.9% of the total explained variance. The ideal points for each new home price range have also been superimposed onto each of the three plots. These points represent the spot that would be occupied by the "ideal product."

Each of the three perceptual maps can be utilized to evaluate each of the residential siding materials. The distance between any two siding materials can be considered as a measure of the substitutability that one material has for the other. In other words, two siding materials located next to one another are considered substitutes by the surveyed builders. Theoretically, the closer a siding material's location falls to an ideal point, the larger its market share should be for homes in the price segment.

The attribute dimensions that builders indicated were the most important to them when making their residential siding purchase decision were (1) high image status and beautiful appearance and (2) fast and easy installation, as seen in Figure 16. Cedar siding was found to occupy the positive halves of both dimensions, indicating that builders felt that cedar possessed a high image status, a beautiful appearance, and was somewhat fast and easy to install. Brick, stucco, cedar shakes and shingles, and redwood siding materials were found to possess slightly greater preference ratings in the high image status and beautiful appearance dimension than cedar. The differences between these materials and cedar, however, were so marginal that it is likely that builders perceive cedar to possess the same image and beauty characteristics as brick, stucco, redwood, and cedar shakes and shingles.

Plywood, OSB, hardboard, aluminum, and vinyl siding products were perceived to be the fastest and easiest to install. Surprisingly, cedar was seen as being somewhat fast and easy to install, being perceived as nearly equal to that of vinyl, aluminum, and hardboard siding materials. The differences among the high image products in the fast and easy to install dimension were substantial. Of the five siding materials that were perceived as possessing high image status and beautiful appearance, cedar ranked the highest on the fast and easy to install dimension. In fact, all other high image siding products were located in the negative half of the perceptual map, with the exception of redwood. The high image status of redwood, while being perceived as nearly the same as cedar, is relatively unimportant, however, since it was found that redwood siding has little presence in the Puget Sound market.

The plotted ideal points in Figure 16 indicated that redwood siding was positioned closest to what builders suggested was the ideal product for new homes priced over $200,000 (ideal points 4, 5, and 6) with respect to the high image status/beautiful appearance and fast and easy installation dimensions. However, of the materials with a presence in the Puget Sound market, solid cedar and cedar shakes and shingles were found to be the materials most closely positioned toward the ideal points for new homes priced over $200,000.

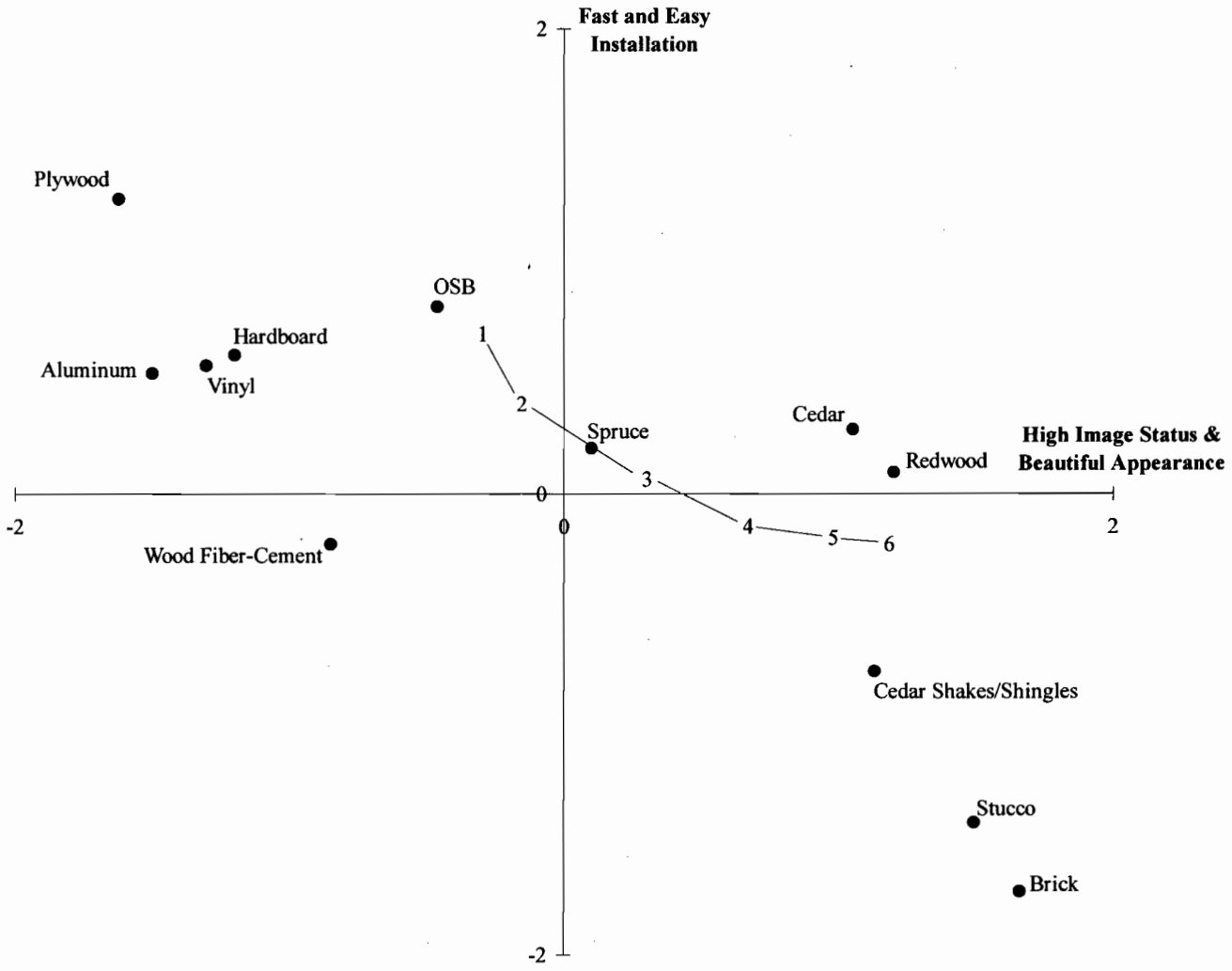

Figure 16. Puget Sound builders' perceptions in 1995 of residential siding products and ideal points along the dimensions of high status image/beautiful appearance and fast and easy installation.

Notes:
The two dimensions accounted for 50.1% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

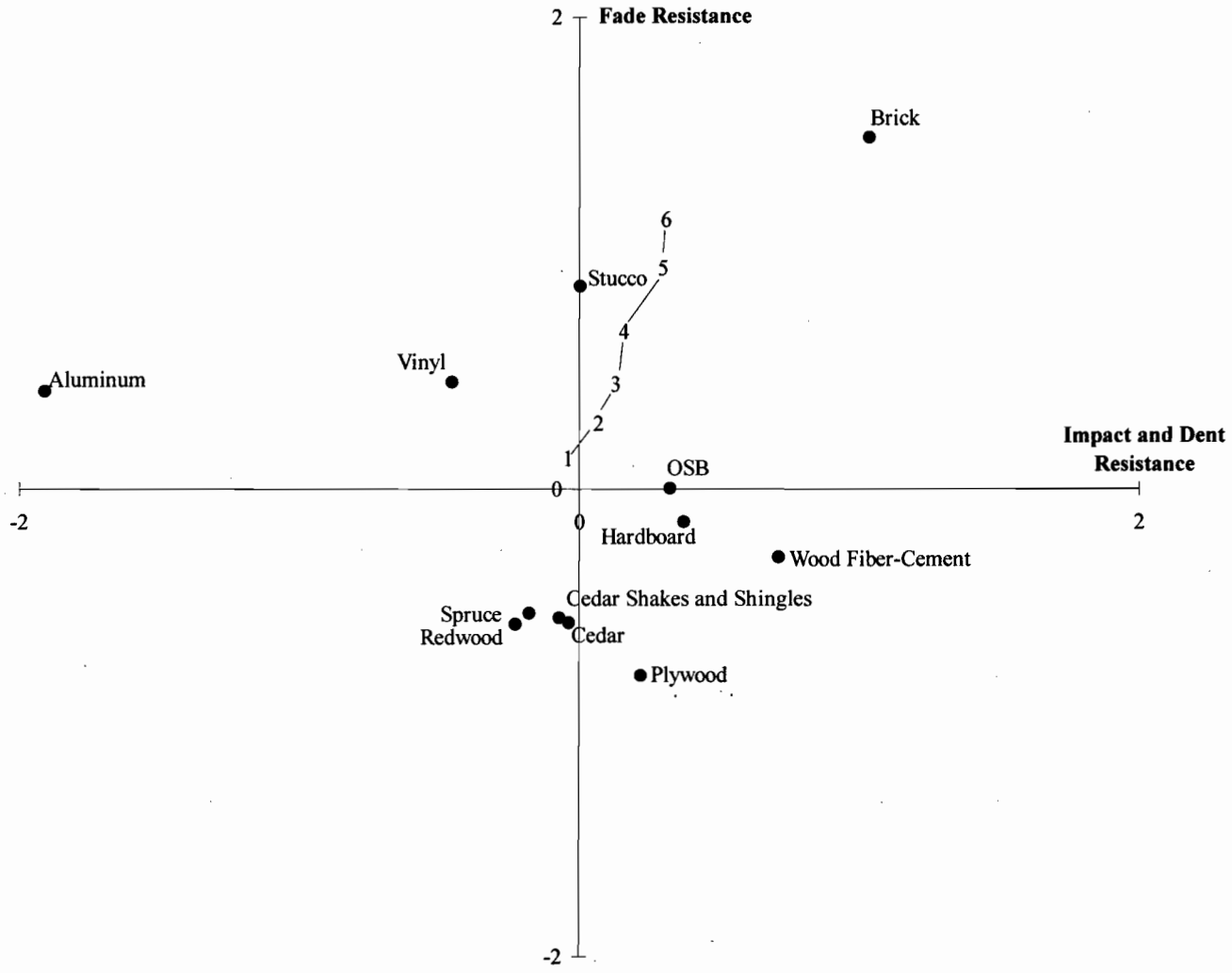

Figure 17. Puget Sound builders' perceptions in 1995 of residential siding products and ideal points along the dimensions of impact/dent resistance and fade resistance.

Notes:
The two dimensions accounted for 20.4% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

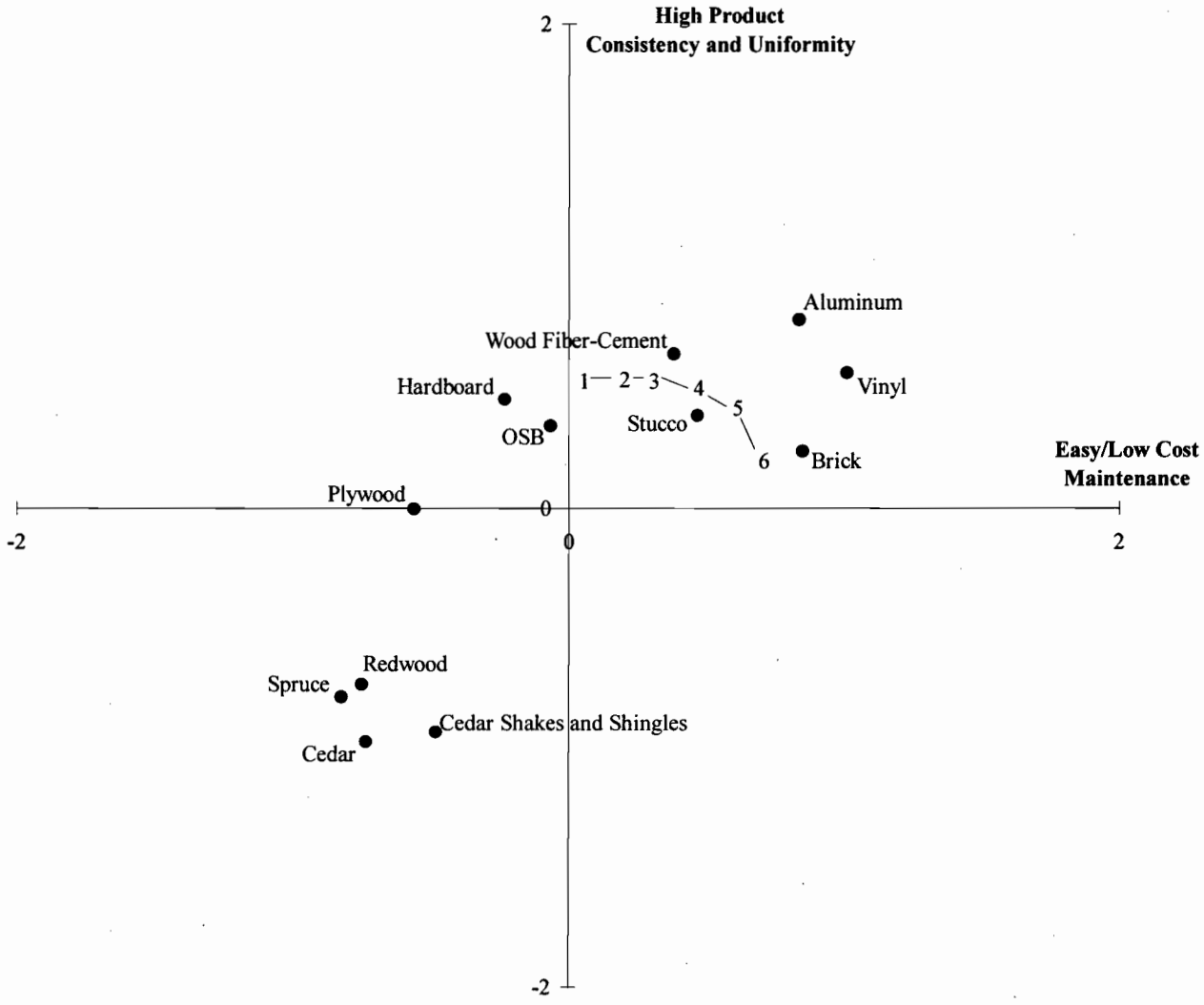

Figure 18. Puget Sound builders' perceptions in 1995 of residential siding products and ideal points along the dimensions of easy/low cost maintenance and high product consistency and uniformity.

Notes:
The two dimensions accounted for 17.9% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

Cedar siding was found to be positioned in the negative half of both the fade resistance and impact/dent resistance dimensions, as shown in Figure 17. Siding materials perceived to have a more advantageous position than cedar along these two dimensions included hardboard, wood fiber-cement, OSB, stucco, and brick. Stucco was found to be positioned closest to the ideal points for new homes priced over $200,000, while OSB and hardboard were the most closely positioned materials for new homes in the lower price ranges.

It is unlikely that any of the siding materials can be repositioned toward the ideal points for the various price ranges of new homes since fade and dent resistance are physical properties of the materials that would be extremely difficult to change. It is interesting, however, that these two dimensions ranked high in the builders' preference structure. However, if cedar manufacturers can determine a method to increase the fade resistance of the siding they produce (for example, through a chemical treatment), they would likely reposition the perception of cedar into a more favorable location on the perceptual map.

The final two dimensions that rated high in the builders' preference structure were easy/low cost maintenance and high product consistency and uniformity, as shown in Figure 18. As the ideal points in the figure indicate, the most advantageous position for a siding material to possess would be in the upper right hand quadrant of the preference map. The close proximity of the each of the ideal points to one another suggests that builders prefer (or expect) siding materials that possess both easy/low cost maintenance and high product consistency and uniformity.

Respondents perceived that aluminum, wood fiber-cement, vinyl, and hardboard siding materials possessed the highest product consistency and uniformity among the twelve materials surveyed. The solid wood siding materials of cedar, spruce, redwood, and cedar shakes and shingles were perceived as possessing the lowest product consistency and uniformity, with solid cedar siding ranking the lowest of all twelve siding materials.

Cedar siding occupies the worst position possible in Figure 18. A strategy to reposition cedar toward the upper right quadrant in the figure, however, is quite feasible. For instance, cedar siding manufacturers could increase the grade reliability within and between each lift sold. In addition, eliminating poor quality material from reaching the market in the first place would likely increase builders perceptions of cedar to the point that they would at least perceive cedar as being on average with all other siding products in terms of consistency and uniformity (a position now held by plywood siding).

In terms of increasing cedar's low rating on the easy/low cost maintenance dimension among builders, manufacturers could prefinish their products. It is also likely that builders' perception of the maintenance of cedar would improve if manufacturers eliminated poor quality material from reaching the market. It should be noted, however, that the cedar manufacturer's ability to increase the perception along the easy/low cost maintenance dimension is much more difficult than in the high product consistency and uniformity dimension. This is due to properties that are inherent with solid wood products (*e.g.*, frequent painting).

In summary, solid cedar siding was found to be perceived by builders as possessing high image status, beautiful appearance, and relatively fast and easy installation characteristics. In addition, cedar siding material was found to be perceived by builders as possessing relatively poor fade resistance, impact and dent resistance, product consistency and uniformity, and maintenance characteristics.

Results of 1996 Survey's Perceptual Mapping Analysis

The product attribute perception data that was obtained in the 1996 follow-up survey was fitted to the perceptual maps that were generated in the 1995 survey analysis. It is generally assumed in longitudinal perceptual mapping analyses that ideal points remain stable over time. Consequently, the ideal point and the axes of the perceptual maps generated from the current survey data are identical to those generated from the 1995 survey data.

The first perceptual map generated from the 1996 survey data is shown in Figure 19, where the high status image/beautiful appearance and fast and easy installation functions accounted for 50.7% of the total explained variance in the analysis. The second plot is shown in Figure 20, where the functions of impact/dent resistance and fade resistance accounted for 22.6% of the total explained variance. Finally, the third plot is shown in Figure 21, where the functions of easy/low cost maintenance and high product consistency and uniformity accounted for 17.6%

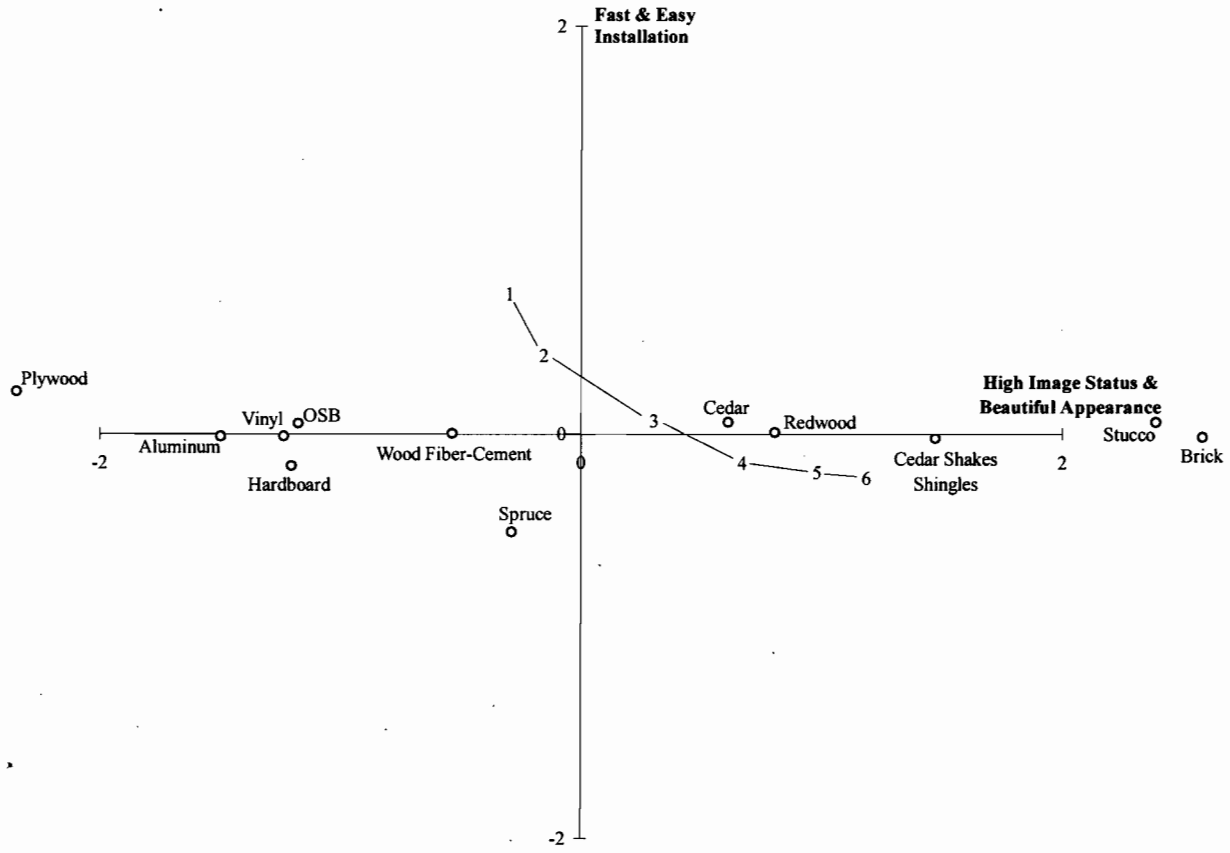

Figure 19. Puget Sound builders' perceptions in 1996 of residential siding products and ideal points along the dimensions of high status image/beautiful appearance and fast and easy installation.

Notes:
The two dimensions accounted for 50.7% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

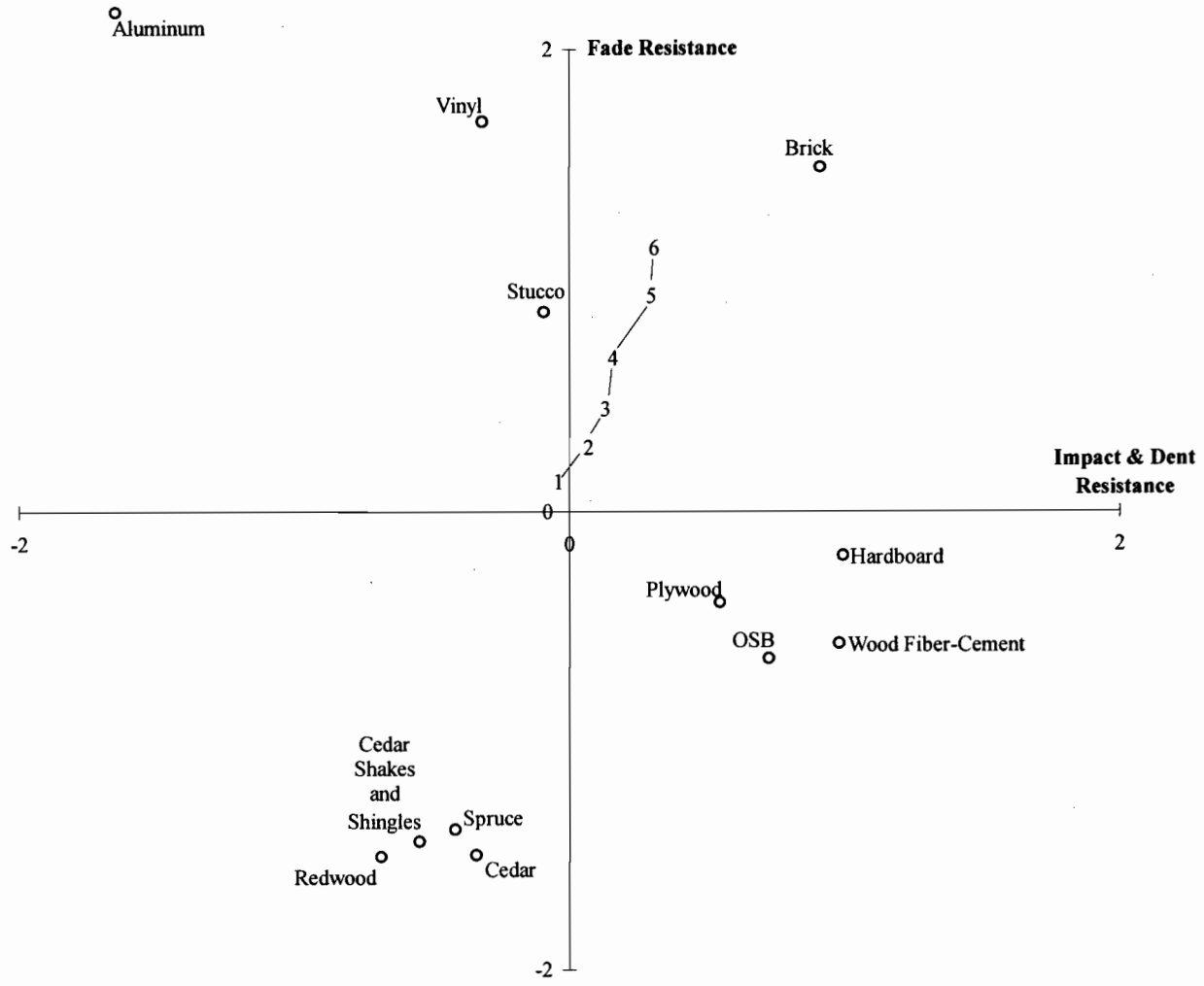

Figure 20. Puget Sound builders' perceptions in 1996 of residential siding products and ideal points along the dimensions of impact/dent resistance and fade resistance.

Notes:
The two dimensions accounted for 22.6% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

of the total explained variance. As with the 1995 survey's perceptual maps, the ideal point for each new home price range has been superimposed onto each of the three plots. These points represent the spot that would be occupied by the "ideal product."

In order to simplify the interpretation of changes in the past two years of builder and contractor perceptions of residential siding materials, the perceptual maps generated from the 1995 and 1996 surveys have been overlaid onto one another. These overlaid perceptual maps are shown in Figure 22, Figure 23, and Figure 24. The black circles in these figures represent where various residential siding materials were situated on the perceptual maps given the 1995 survey analysis, while the open circles represent the materials' placement on the perceptual maps given the 1996 survey analysis.

Figure 22 indicates that plywood and OSB experienced a significant decline among builders' and contractors' perceptions along the high image status and beautiful appearance attribute. Much of this decline can likely be attributed to the problems associated with OSB siding over the past several years in the Puget Sound market. Other siding materials that experienced a small decline along the high image status and beautiful appearance attribute were cedar, redwood, and spruce, all solid wood siding materials. Stucco and brick both experienced a moderate increase along the high image status and beautiful appearance attribute, while cedar shakes and shingles and wood-fiber cement siding materials experienced small gains along this attribute. Builder and contractor perceptions for aluminum, vinyl, hardboard siding materials along the high image status and beautiful appearance attribute remained essentially unchanged over the past year. Additionally, Figure 22 reveals that the spread between the various siding materials along the high image status and beautiful appearance attribute has increased over the past year. This indicates that builders and contractors are differentiating more between products based on this particular attribute.

The results displayed in Figure 22 reveal that the fast and easy installation attribute has lost a significant amount of its ability to differentiate between the various siding materials over the past year. In fact, builders and contractors indicated that nearly every siding material rated as being "average" along this attribute, the exception being spruce, which was perceived as being the slowest and hardest siding material to install, and plywood, which was perceived as being the fastest and easiest siding material to install.

Figure 23 indicates that there has been relatively little change in builder and contractor perceptions of residential siding materials along the impact and dent resistance attribute, as well as the fade resistance attribute. Perceptual changes along these two attributes tended to be grouped according to similarity among the products. For example, the solid wood siding materials of redwood, spruce, cedar shakes and shingles, and cedar moved in nearly the identical direction along the two product attributes. For the most part, the perceptual map in Figure 23 signifies that builder and contractor perceptions along the product attributes of fade resistance and impact and dent resistance have remained relatively stable over the past two years.

Finally, Figure 24 indicates that there have been substantial changes in builder and contractor perceptions for the various siding materials along the easy and low cost maintenance attribute. All solid wood siding materials (redwood, spruce, cedar shakes and shingles, and cedar) and OSB experienced a fairly large decline over the past two years along this attribute, while aluminum, brick, vinyl, and stucco experienced substantial increases.

The results displayed in Figure 24 also reveal that the high product consistency and uniformity attribute has lost a significant amount of its ability to differentiate between the various siding materials over the past year. All of the siding materials surveyed were found to be perceived equally along the high product consistency and uniformity attribute.

One comment concerning shifts in attributes should be made when comparing the results of the perceptual analysis over time. It is frequently not the case that a downward shift (or leftward shift) in a given attribute within a perceptual map signifies an increasingly negative situation. When examining shifts in attribute perceptions, be aware that attributes more closely situated next to ideal points will generally have a greater market share than those situated a greater distance from the ideal point. "More" of a given attribute is not necessarily "better" for instance, there are diminishing returns to increasing the high image attribute to a siding material. Focusing on the ideal points in each of the perceptual maps and how the different siding materials are situated around these ideal points *relative to one another* will provide more accurate, as well as clear, interpretations of the survey results.

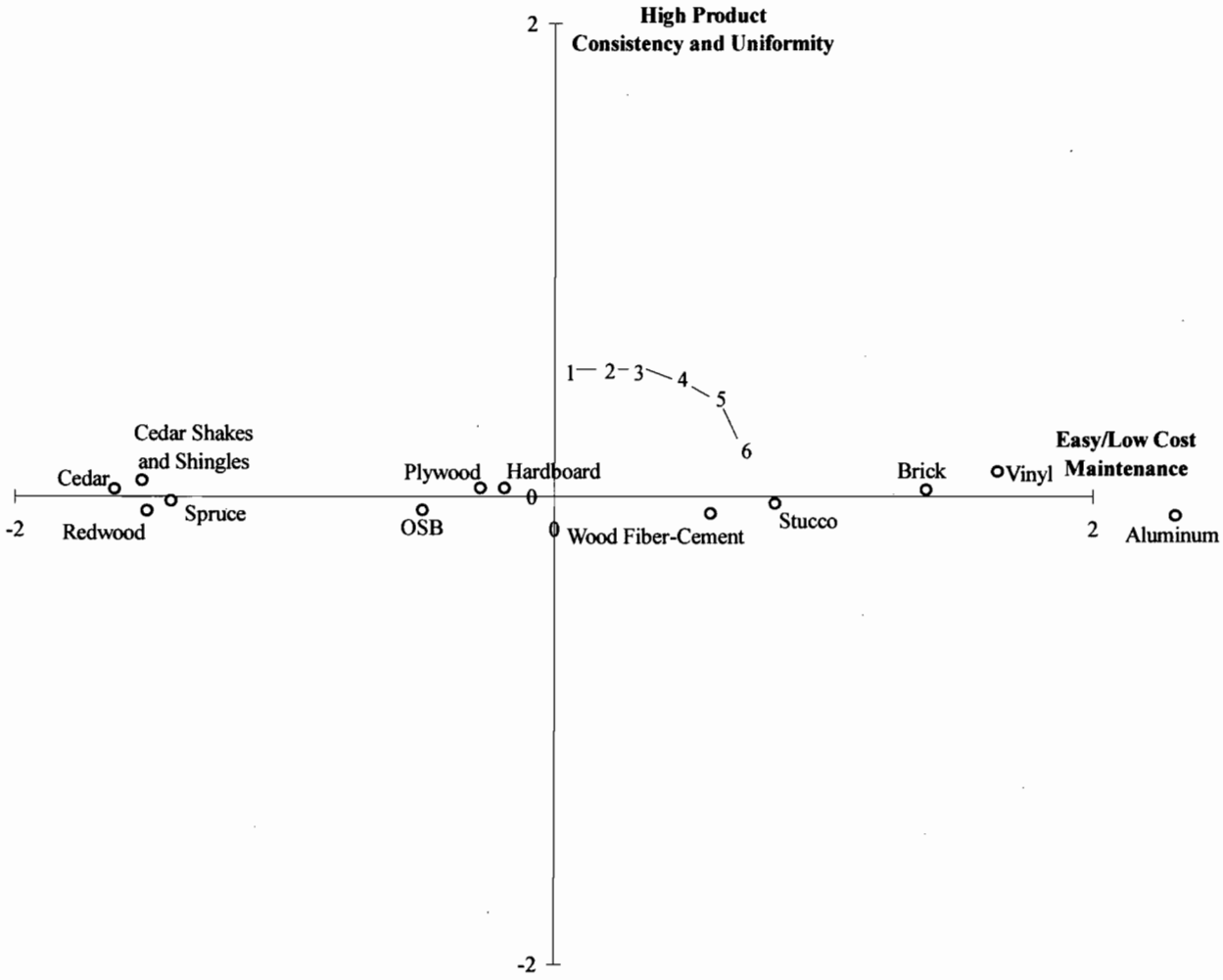

Figure 21. Puget Sound builders' perceptions in 1996 of residential siding products and ideal points along the dimensions of easy/low cost maintenance and high product consistency and uniformity.

Notes:
The two dimensions accounted for 17.6% of the total explained variance in the analysis.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
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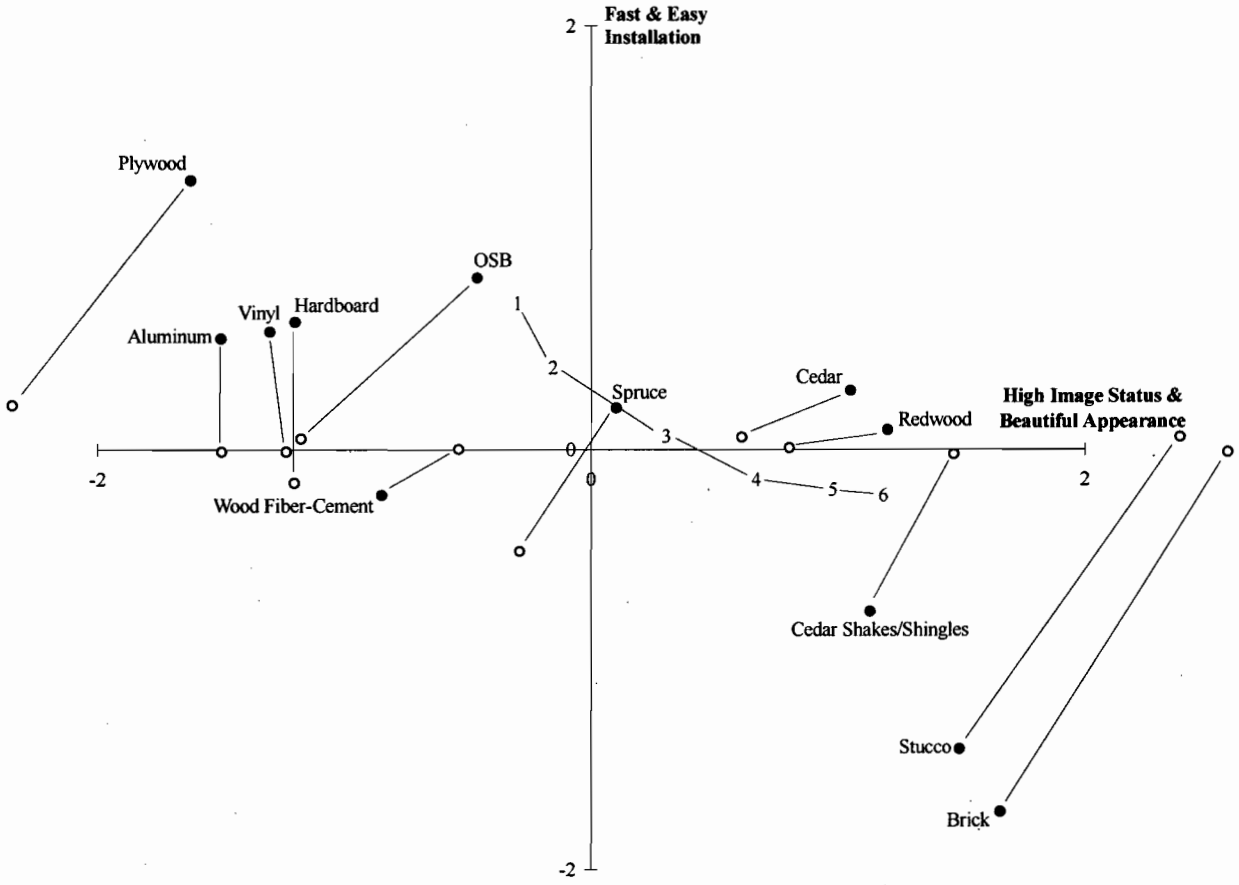

Figure 22. Puget Sound builders' perceptions in 1995 and 1996 of residential siding products and ideal points along the dimensions of high status image/beautiful appearance and fast and easy installation.

Notes:
Black circles (●) represent 1995 survey results and open circles (O) represent 1996 survey results.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

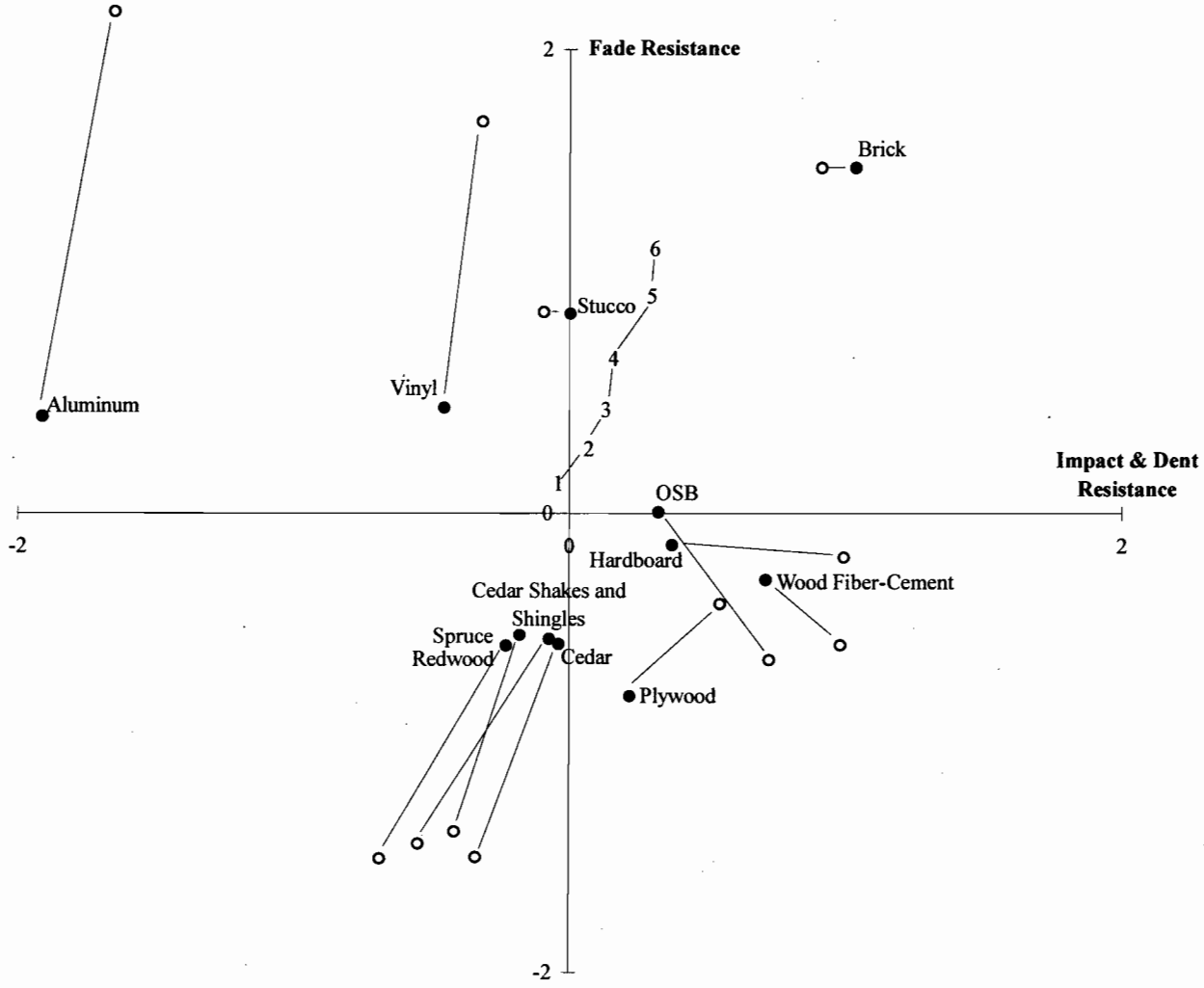

Figure 23. Puget Sound builders' perceptions in 1995 and 1996 of residential siding products and ideal points along the dimensions of impact/dent resistance and fade resistance.

Notes:
Black circles (●) represent 1995 survey results and open circles (O) represent 1996 survey results.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
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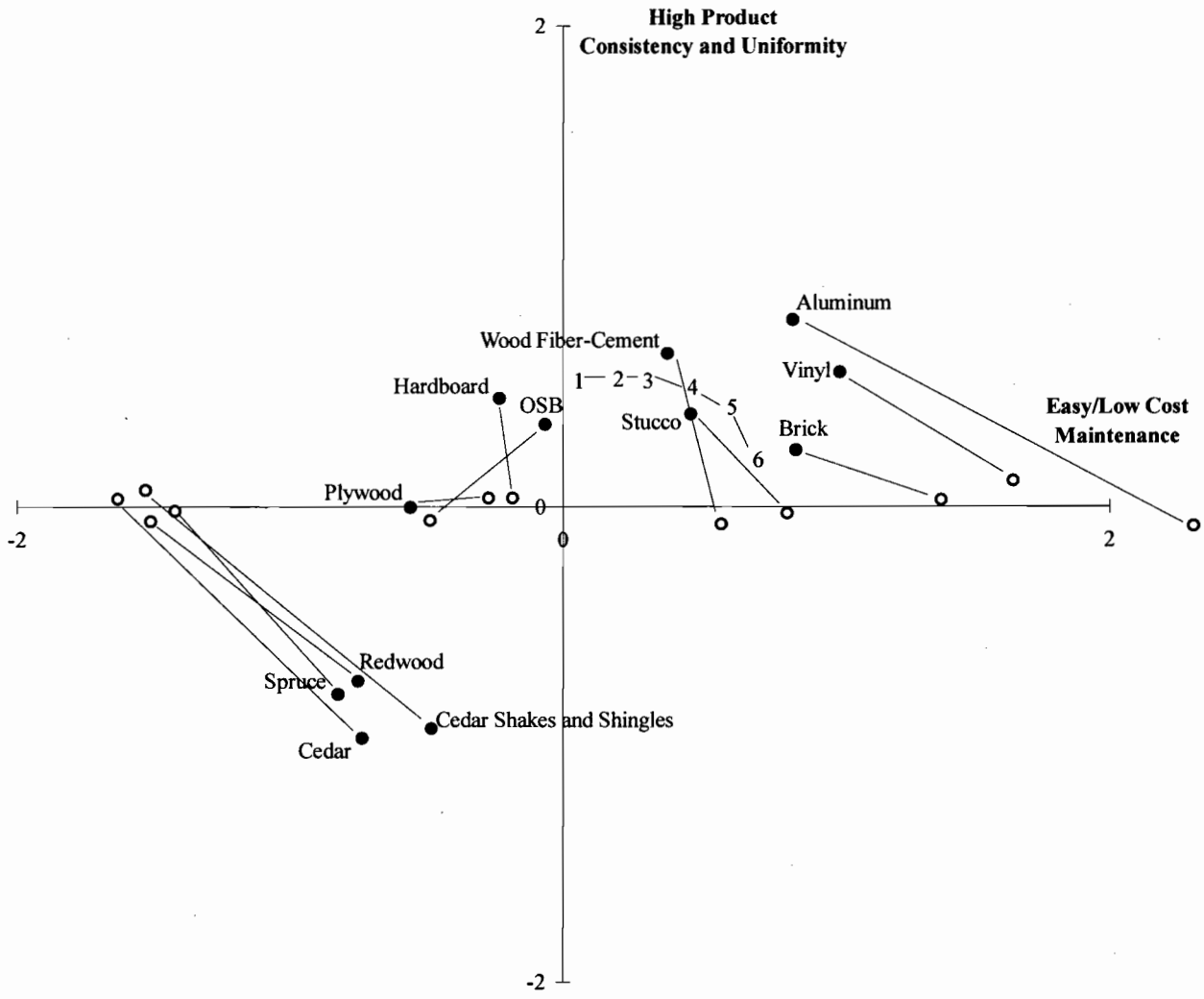

Figure 24. Puget Sound builders' perceptions in 1995 and 1996 of residential siding products and ideal points along the dimensions of easy/low cost maintenance and high product consistency and uniformity.

Notes:
Black circles (●) represent 1995 survey results and open circles (O) represent 1996 survey results.
Ideal points are indicated by the connected numbers 1-6 and relate to preferences for new homes priced as follows:

1 = Under $100,000
2 = $100,000 - $149,999
3 = $150,000 - $199,000
4 = $200,000 - $249,000
5 = $250,000 - $400,000
6 = Over $400,000

Conclusions

Several conclusions can be made given the results of this study. First, it is expected that the overall demand for residential siding materials will again decline over the next 12 to 24 months, as survey participants indicated that they expected to build fewer new residential units in 1997. This decline in demand, however, will bring the number of housing starts back toward its historical annual average. Decreasing demand is expected to heighten competition among the various siding materials manufacturers.

Second, the survey results clearly indicated a significant instability in the Puget Sound residential siding market, with most of the instability being caused by a huge decline in the use of OSB siding and a considerable gain in the use of wood-fiber cement siding. OSB experienced a 32.6% decline in market share in the one-year time period between the two surveys; this decline represents over 5.362 million square feet of siding material. Most of OSB siding's share was transferred to wood-fiber cement, which increased its market share to 18.3% from 3.21%. The average number of different siding materials builders were utilizing from one year to the next also measured market instability. Results from the first survey indicated that builders used an average of 2.66 siding materials in 1994. This average increased by over 30% to 3.56 siding materials the following year.

Third, western red cedar's 1995 market share in the Puget Sound residential siding market was found to be 6.05% as compared to 8.86% in 1994, representing a share decline of 31.7%. We must stress that lower overall market share does not signify an ineffective WRCLA promotional campaign. Market share can always be "bought" through several means (*e.g.*, selling high volumes of low quality and low priced cedar in the lower-end home market, purchasing competitors), but higher market share does not necessarily equate to higher margins and profitability. Additionally, we were not overly surprised to see a decline in western red cedar's market share since (1) cedar was being heavily utilized in the lower-end home market (while the promotional effort of the WRCLA was targeting the high-end market) and (2) there have been steady rises in the price of western red cedar siding over the past year which has priced many low-end builders out of the cedar market.

Fourth, several favorable changes were seen in western red cedar siding usage patterns. The 1995 survey results indicated that for every builder who increased use of cedar siding between 1990 to 1994, 15.3 builders decreased use. Over the past year, however, this negative pattern reversed; for every builder increasing use of western red cedar siding, only 0.7 builders decreased use. Furthermore, survey results indicated that western red cedar siding use has been declining in the lower-end housing market while increasing in the upper end of the market.

Fifth, survey results from the past two years clearly revealed that builder preferences for western red cedar on upper end homes have increased, while preferences for western red cedar siding on lower-end homes has declined. In other words, as the price of a new home increases, builders increasingly display a preference for western red cedar siding. These results are a clear indication that the WRCLA promotional strategy has been effective in affecting/changing builder perceptions. The WRCLA promotional campaign was also successful in the level of exposure that it achieved among Puget Sound builders. Nearly one-half of all Puget Sound builders recalled having seen at least three WRCLA promotional advertisements over the past year. Furthermore, the survey results indicated that the purchasing decisions of approximately 12.5% of all builders in the Puget Sound market were influenced by the WRCLA promotional advertisements. This percentage of purchasing decision influence is very high for an industrial product; past market research for other industrial products indicates that advertising generally influences about 3 to 5% of all purchasing decisions within a given market.

Sixth, approximately 9% of all builders indicated that they perceived that western red cedar siding had decreased in overall quality over the time period covering the two surveys. Over 14% of all builders, however, indicated that they perceived an increase in overall western red cedar siding quality over the same time period; the remaining 77% of builders indicated that they perceived no change in western red cedar quality. These numbers are encouraging when the data is disaggregated and applied only to those builders who have used western red cedar siding over the past two survey periods. Nearly 65% of *actual users* of western red cedar siding perceived that the overall quality of western red cedar siding material had increased and 12% perceived a decrease.

Finally, the results of the survey presented in this study indicated that the WRCLA promotional strategy was effective. Overall builder perceptions of western red cedar residential siding have improved significantly in less than a one-year time span, especially in the higher-end home market. These results bode well for manufacturers, wholesalers, and retailers of western red cedar siding since higher margins are typically achieved in the higher-end home market. It is expected that the improving builder perceptions of cedar siding will begin to pay off as higher-end home builders start to shift to a product that possesses an increasingly high status image and reliable quality.

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APPENDIX A

Cover Letter, Follow-up Letter and Questionnaire

Cover Letter

October 14, 1996

Dear :

Roughly 18 months ago, your firm participated in a study assessing the Puget Sound residential siding market that was conducted by the Center for International Trade in Forest Products (CINTRAFOR) at the University of Washington. We greatly appreciate your firm's participation in that study. I am again asking for your participation for the final stage of this research project. The purpose of this final stage is to reassess the opinions that construction professionals like yourself have toward various siding materials currently being used in residential construction. Your answers to the survey questions are very important to the outcome of this study. They will allow us to detect whether the changes that were implemented by manufacturers and distributors of siding over the past 18 months have been effective, and if not, how they can be adjusted to better suit the needs of the market.

As a token of our appreciation for your participation in this study, let us buy you a hot cup of coffee. Perhaps while you're drinking it, you will take just a few minutes to complete the enclosed survey.

All information that you provide will be held in the strictest confidence and will only be used in combination with the information provided by other firms in the Puget Sound area. You will also notice an identification number on the front page of your survey. This number is for mailing purposes only. It provides us with a means of removing your firm's name from our follow-up mailing list once your survey has been returned to CINTRAFOR.

If you are interested in receiving a summary of the final results of this study, simply check the appropriate space on the back of your survey; or if you prefer, request the information in a separate letter.

We would greatly appreciate it if you could complete and return the survey at your earliest possible convenience. I would be happy to answer any questions you might have. Please feel free to contact me at the phone or fax numbers below.

Sincerely,

Steve Shook
Project Leader
Center for International Trade in Forest Products
University of Washington
Telephone: (206) 543-0827
Fax: (206) 685-0790

Follow-up Letter

October 22, 1996

Dear :

I recently sent you a letter requesting your company's participation in a survey being conducted by the Center for International Trade in Forest Products (CINTRAFOR) at the University of Washington. If you have already returned your survey, you can disregard this letter — thank you for your participation!

I realize that you are likely to be busy and may not yet have found the time to complete your survey. However, I would like to encourage you to do so. The survey takes about 10 minutes to complete, and you need not identify yourself or your company.

Your participation in this project is extremely important to us. Your firm is one of only a small number of firms that are being asked to provide their opinions in this follow-up study concerning residential siding materials. Therefore, the answers that your firm provides will be of significant importance to the accuracy of the results. I have enclosed another survey in case you have misplaced the one sent previously. Please return your completed survey in the postage-paid return envelope at your earliest convenience.

If you are interested in receiving a summary of the final results of this study, simply check the appropriate space on the back of your survey; or if you prefer, request the information in a separate letter.

Please be reminded that all information that you provide will be held in the strictest confidence and will only be used in combination with information provided from other firms in the Puget Sound area.

Once again, thank you for your cooperation and help!

Sincerely,

Steve Shook
Project Leader
Center for International Trade in Forest Products
University of Washington
Telephone: (206) 616-8197
Fax: (206) 685-0790

Questionnaire

APPENDIX B

Relevant Raw Data Calculations

Means and Standard Deviations for Selected Survey Questions

Table 18. Builders' rankings of siding materials along competitive price attribute.

Rank[b]	Siding Material	Competitive Price Mean Scores[a] 1995 Survey	Competitive Price Mean Scores[a] 1996 Survey	Paired Significance (two-tailed)[c]
1	OSB	2.96	2.88	
2	Plywood	2.80	3.00	
3	Hardboard	2.78	2.84	
4	Wood Fiber-Cement	2.76	2.78	
5	Vinyl	2.43	2.49	
6	Brick	2.37	1.90	
7	Cedar (solid)	2.30	2.22	
8	Stucco	2.25	1.96	
9	Cedar Shakes/Shingles	2.19	1.92	❖↓
10	Redwood (solid)	2.02	1.73	❖↓
11	Aluminum	2.00	1.98	
12	Spruce (solid)	1.98	1.90	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 19. Builders' rankings of siding materials along easy and low cost maintenance attribute.

Rank[b]	Siding Material	Easy and Low Cost Maintenance Mean Scores[a] 1995 Survey	Easy and Low Cost Maintenance Mean Scores[a] 1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.85	3.70	
2	Vinyl	3.49	3.57	
3	Stucco	3.44	3.28	
4	Wood Fiber-Cement	3.32	3.13	
5	Aluminum	3.31	3.35	
6	OSB	2.74	2.31	❖↓
7	Hardboard	2.48	2.15	❖↓
8	Redwood (solid)	2.33	2.26	
9	Cedar Shakes/Shingles	2.32	2.32	
10	Cedar (solid)	2.18	2.14	
10	Plywood	2.18	2.14	
12	Spruce (solid)	2.00	2.00	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 20. Builders' rankings of siding materials along fast and easy installation attribute.

Rank[b]	Siding Material	Fast and Easy Installation Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Plywood	3.55	3.34	❖🡻
2	OSB	3.27	2.95	❖🡻
3	Hardboard	3.17	2.73	❖🡻
4	Vinyl	3.04	2.90	
5	Aluminum	2.94	2.79	
6	Cedar (solid)	2.73	2.57	
7	Spruce (solid)	2.58	2.46	
8	Redwood (solid)	2.55	2.51	
9	Wood Fiber-Cement	2.55	2.53	
10	Cedar Shakes/Shingles	2.02	1.98	
11	Stucco	1.80	1.71	
12	Brick	1.69	1.59	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The 🡹 and 🡻 symbols indicate the direction of the statistically significant change.

Table 21. Builders' rankings of siding materials along resistance to impacts and denting attribute.

Rank[b]	Siding Material	Resistance to Impact and Denting Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.75	3.77	
2	Wood Fiber-Cement	3.34	3.46	
3	Hardboard	3.09	3.06	
4	OSB	3.07	2.91	
5	Stucco	2.86	2.80	
6	Plywood	2.81	2.79	
7	Vinyl	2.73	2.57	
8	Cedar (solid)	2.63	2.59	
9	Redwood (solid)	2.60	2.56	
10	Cedar Shakes/Shingles	2.54	2.40	
11	Spruce (solid)	2.51	2.58	
12	Aluminum	1.50	1.54	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The 🡹 and 🡻 indicate the direction of the statistically significant change.

Table 22. Builders' rankings of siding materials along beautiful appearance attribute.

Rank[b]	Siding Material	Beautiful Appearance Mean Scores[a] 1995 Survey	Beautiful Appearance Mean Scores[a] 1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.92	3.75	❖🡻
2	Stucco	3.59	3.59	
3	Cedar Shakes/Shingles	3.55	3.49	
4	Redwood (solid)	3.33	3.31	
5	Cedar (solid)	3.20	3.28	
6	Spruce (solid)	2.77	2.88	
7	OSB	2.65	2.61	
8	Wood Fiber-Cement	2.51	2.61	
9	Vinyl	2.21	2.08	
10	Hardboard	2.19	2.13	
11	Aluminum	1.92	1.98	
12	Plywood	1.80	1.75	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The 🡹 and 🡻 symbols indicate the direction of the statistically significant change.

Table 23. Builders' rankings of siding materials along high status and quality image attribute.

Rank[b]	Siding Material	High Status and Quality Image Mean Scores[a] 1995 Survey	High Status and Quality Image Mean Scores[a] 1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.94	3.89	
2	Stucco	3.82	3.72	
3	Cedar Shakes/Shingles	3.35	3.45	
4	Redwood (solid)	3.30	3.30	
5	Cedar (solid)	3.24	3.14	
6	Spruce (solid)	2.61	2.59	
7	Wood Fiber-Cement	2.31	2.41	
8	OSB	2.22	1.98	❖🡻
9	Vinyl	1.75	1.83	
10	Hardboard	1.71	1.71	
11	Aluminum	1.61	1.65	
12	Plywood	1.48	1.50	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The 🡹 and 🡻 symbols indicate the direction of the statistically significant change.

Table 24. Builders' rankings of siding materials along high durability attribute.

Rank[b]	Siding Material	High Durability Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.94	3.94	
2	Stucco	3.41	3.43	
3	Wood Fiber-Cement	3.36	3.36	
4	Vinyl	3.17	3.04	
5	Redwood (solid)	2.80	2.84	
6	Cedar Shakes/Shingles	2.78	2.78	
7	Cedar (solid)	2.67	2.78	
7	Aluminum	2.67	2.75	
9	OSB	2.60	2.29	❖↓
10	Hardboard	2.58	2.42	
11	Spruce (solid)	2.35	2.47	
12	Plywood	2.29	2.31	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 25. Builders' rankings of siding materials along wide color selection attribute.

Rank[b]	Siding Material	Wide Color Selection Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Stucco	3.18	3.24	
2	Brick	3.06	3.06	
3	Vinyl	2.90	2.79	
4	Aluminum	2.76	2.74	
5	Cedar (solid)	2.70	2.68	
6	Plywood	2.69	2.41	
7	Hardboard	2.64	2.43	
8	OSB	2.59	2.46	
9	Wood Fiber-Cement	2.57	2.51	
10	Cedar Shakes/Shingles	2.56	2.62	
11	Spruce (solid)	2.55	2.55	
12	Redwood (solid)	2.51	2.55	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 26. Builders' rankings of siding materials along variety of textures and profiles attribute.

Rank[b]	Siding Material	Variety of Textures and Profiles Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	2.90	3.04	
2	Stucco	2.78	2.90	
3	Cedar Shakes/Shingles	2.34	2.36	
4	Cedar (solid)	2.28	2.24	
5	Vinyl	2.22	2.04	
6	Redwood (solid)	2.13	2.23	
7	Hardboard	2.08	2.02	
8	Wood Fiber-Cement	2.04	1.98	
8	Spruce (solid)	2.04	2.13	
10	OSB	2.02	1.96	
10	Aluminum	2.02	1.98	
12	Plywood	1.98	1.94	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 27. Builders' rankings of siding materials along fade resistance attribute.

Rank[b]	Siding Material	Fade Resistance Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.85	3.87	
2	Stucco	3.20	3.31	
3	Vinyl	2.86	2.84	
4	Aluminum	2.72	2.78	
5	Wood Fiber-Cement	2.58	2.44	
6	OSB	2.48	2.33	
7	Hardboard	2.35	2.20	
8	Redwood (solid)	2.13	2.15	
9	Spruce (solid)	2.10	2.20	
10	Cedar Shakes/Shingles	2.08	2.10	
11	Cedar (solid)	2.06	2.29	❖↑
12	Plywood	1.96	2.04	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 28. Builders' rankings of siding materials along dimensional stability attribute.

Rank[b]	Siding Material	Dimensional Stability Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.65	3.76	
2	Stucco	3.35	3.37	
3	Wood Fiber-Cement	3.22	3.24	
4	Aluminum	2.71	2.94	
5	Vinyl	2.70	2.89	
6	Plywood	2.66	2.62	
7	Cedar Shakes/Shingles	2.44	2.56	
7	Redwood (solid)	2.44	2.38	
9	Hardboard	2.43	2.45	
10	OSB	2.38	2.35	
11	Cedar (solid)	2.33	2.29	
12	Spruce (solid)	2.26	2.20	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 29. Builders' rankings of siding materials along high product consistency and uniformity attribute.

Rank[b]	Siding Material	High Product Consistency and Uniformity Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Brick	3.42	3.57	
2	Aluminum	3.41	3.29	
3	Wood Fiber-Cement	3.39	3.31	
4	Vinyl	3.38	3.31	
5	Stucco	3.35	3.33	
6	Hardboard	3.20	2.92	❖↓
7	OSB	3.13	2.93	
8	Plywood	2.75	2.85	
9	Redwood (solid)	2.47	2.43	
10	Spruce (solid)	2.35	2.31	
11	Cedar Shakes/Shingles	2.34	2.38	
12	Cedar (solid)	2.29	2.35	

[a] Mean score is based on a four-point Likert scale in which the siding material possesses the attribute: 1="Not At All," 2="Limited Degree," 3="Considerable Degree," and 4="High Degree."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 30. Builders' product attribute importance ratings along 25 siding attributes.

Rank[b]	Product Attribute	Attribute Importance Rating Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	Holds Stains and Paints	4.13	3.98	
2	Beautiful Appearance	4.04	3.91	
3	Availability	3.98	3.96	
4	Competitive Price	3.80	3.71	
5	Service From Wholesaler/Retailer	3.65	3.41	❖↓
6	High Status and Quality Image	3.60	3.67	
7	Warranty/Guarantee	3.58	3.47	
7	Dimensional Stability	3.58	3.67	
9	Service From Manufacturer	3.56	3.19	❖↓
10	High Durability	3.53	3.67	
10	Mold/Mildew Resistance	3.53	3.62	
12	Fast/Easy Installation	3.52	3.43	
13	Low/Easy Maintenance	3.45	3.42	
14	Easy to Repair	3.40	3.31	
15	Impact/Dent Resistance	3.04	3.02	
16	Disposal of Waste	2.94	2.69	
17	Fade Resistance	2.85	2.96	
18	Variety of Sizes Available	2.83	2.83	
19	Variety of Textures and Profiles	2.75	2.65	
20	Structural Strength	2.52	2.44	
21	Wide Color Selection	2.49	2.51	
22	Fire Resistance	2.45	2.49	
23	Brand Name Product	2.39	2.41	
24	Material is "Natural"	2.26	2.45	
25	Thermal Insulation	2.00	2.15	

[a] Mean score is based on a five-point Likert scale in which the importance of the siding attribute is: 1="Not Important At All," 2="Of Little Importance," 3="Important," 4="Very Important," and 5="Of Critical Importance."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.

Table 31. Builders' perceptions of differences between 25 siding product attributes.

Rank[b]	Product Attribute	Attribute Differences Rating Mean Scores[a] 1995 Survey	1996 Survey	Paired Significance (two-tailed)[c]
1	High Status and Quality Image	3.51	3.45	
2	Competitive Price	3.45	3.40	
3	Low/Easy Maintenance	3.25	3.23	
8	Dimensional Stability	3.04	3.02	
9	Impact/Dent Resistance	3.02	3.02	
10	High Durability	3.00	3.09	
11	Variety of Textures and Profiles	2.96	2.87	
12	Variety of Sizes Available	2.91	2.85	
13	Structural Strength	2.88	2.87	
14	Easy to Repair	2.87	3.02	
15	Fade Resistance	2.81	2.79	
16	Mold/Mildew Resistance	2.75	2.92	
17	Thermal Insulation	2.73	2.63	
18	Holds Stains and Paints	2.72	2.74	
18	Wide Color Selection	2.72	2.94	
20	Warranty/Guarantee	2.66	2.91	
21	Service From Manufacturer	2.58	2.58	
22	Brand Name Product	2.57	2.79	
23	Disposal of Waste	2.55	2.55	
24	Service From Wholesaler/Retailer	2.42	2.53	
25	Availability	2.40	2.54	

[a] Mean score is based on a four-point Likert scale in which difference in the attribute among the various siding materials is: 1="Very Similar," 2="Similar," 3="Different," and 4="Very Different."

[b] Rank of each siding material is based on the results of the 1995 survey.

[c] The ❖ symbol indicates that there was a significant difference in the survey participants' 1995 and 1996 responses when utilizing a two-sided paired t-test at the 0.05 confidence level. The ↑ and ↓ symbols indicate the direction of the statistically significant change.