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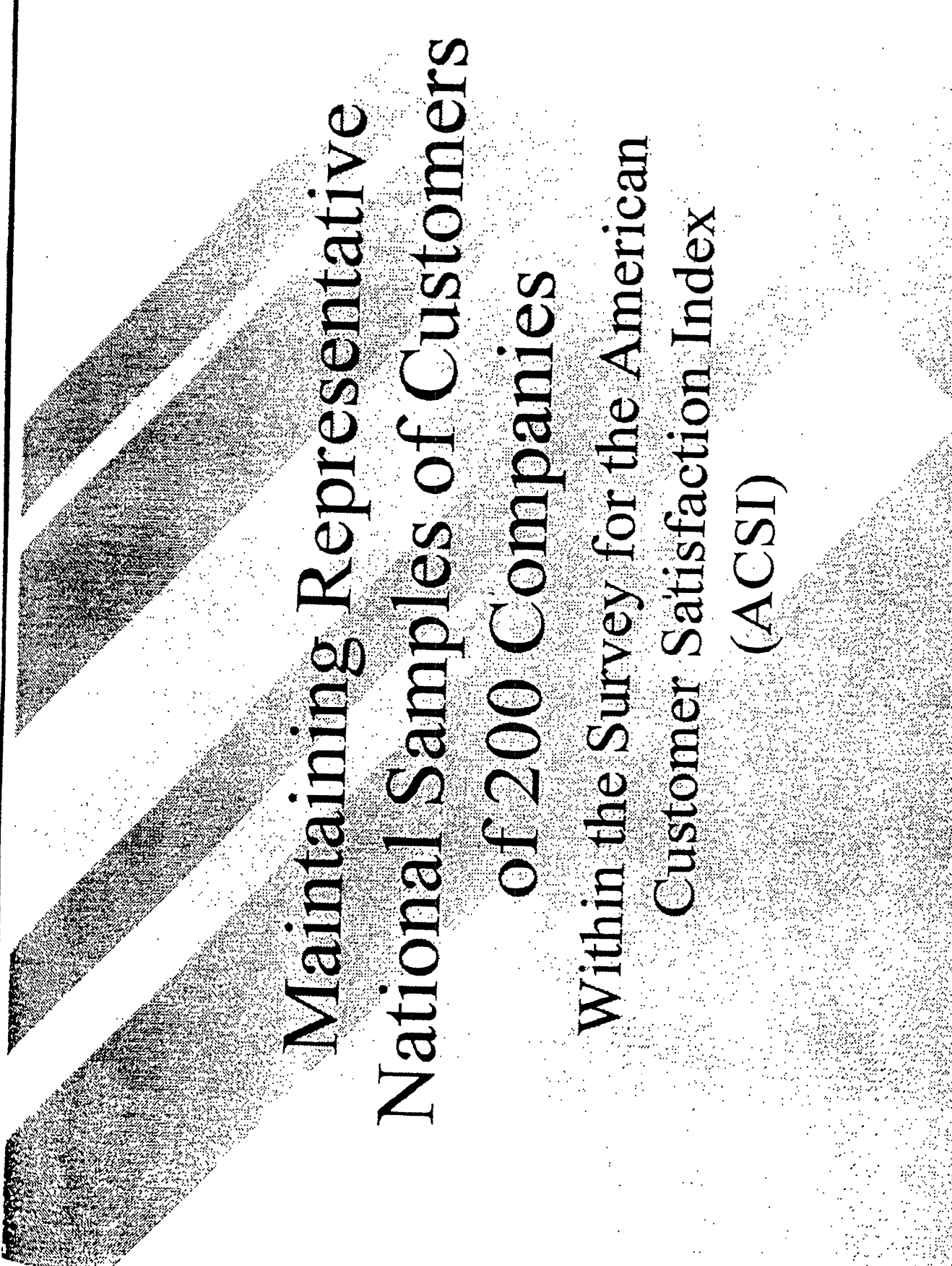
**MAINTAINING REPRESENTATIVE  
NATIONAL SAMPLES OF CUSTOMERS  
OF 200 COMPANIES  
WITHIN THE SURVEY FOR THE AMERICAN CUSTOMER  
SATISFACTION INDEX  
(ACSI)**

WORKING PAPER #9690-01

BARBARA EVERITT BRYANT  
UNIVERSITY OF MICHIGAN

JANICE A. BROWN  
MARKET STRATEGIES, INC.

ANN SULLIVAN MARSDEN  
MARKET OPINION RESEARCH - PACE



**Maintaining Representative  
National Samples of Customers  
of 200 Companies**

**Within the Survey for the American  
Customer Satisfaction Index  
(ACSI)**

# Maintaining 200 Samples

- Barbara Everitt Bryant
- University of Michigan Business School
- 
- Janice A. Brown
- Market Strategies, Inc.
- 
- Anne Sullivan Marsden
- Market Opinion Research-PACE

# **Maintaining Representative National Samples**

## **of Customers of 200 Companies**

### **Within the Survey for the American Customer Satisfaction Index (ACSI)**

**Barbara Everitt Bryant**  
**University of Michigan Business School**

**Janice A. Brown**  
**Market Strategies, Inc.**

**Anne Sullivan Marsden**  
**Market Opinion Research-PACE**

**for the Midwest Association of Public Opinion Research**  
**Chicago, Illinois**

**November 17, 1995**

Have you ever tried to maintain 200 national, representative, random-digit-dial (RDD) samples of customers simultaneously selected from the same sampling frame? That's the sampling and data collection challenge for the American Customer Satisfaction Index, an economic indicator of customer satisfaction with the quality of goods and services purchased and used by U.S. households.

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FIGURE 1: WELCOME TO THE AMERICAN CUSTOMER SATISFACTION INDEX

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ACSI, which is cosponsored by the University of Michigan Business School and the American Society for Quality Control, is a uniform, cross-industry index now completing its second year.

ACSI is based on econometric modeling of the satisfaction of customers of 200 companies in 34 industries in seven sectors of the economy which produce almost 38% of the gross domestic product.

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FIGURE 2: ACSI: NATIONAL ECONOMY, SECTORS AND INDUSTRIES

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The ACSI uses a multi-equation model, tested in Sweden since 1989, with pretests in the U.S. in 1993 and 1994, and now used for two years here.

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FIGURE 3: THE ANALYSIS MODEL

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The model describes the relationships among six key constructs, each of which is a weighted average of two or three evaluation questions asked customers: (1) customer expectations, (2) customer perceptions of quality based on experience, (3) customer perceptions of value, (4) customer satisfaction, the ACSI, based on questions on overall satisfaction, whether or not the goods or service fell short of, met, or exceeded expectations, and comparison of the good or service received to an ideal one. ACSI is related, in turn, to its outcomes--complaints, and customer loyalty. Loyalty is measured by questions on intent to repurchase and on several price tolerance questions.

The input to the separate modeling of satisfaction for each of the 200 companies comes from interviews with the customers of those companies. As you can see from the model, there are six blocks of substantive questions, 17 in all, plus eight demographic questions.

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FIGURE 4: THE QUESTIONS

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The challenge is not the interview, which is a relatively straight forward one, but the screening to actual customers and the simultaneous management of 200 samples in a cost effective manner. Selection and maintenance of so many samples at once is made more challenging because the incidence of purchase and use varies dramatically by industry and, within each industry, the market shares of the measured companies have a wide range. On top of that, ACSI considers as customers only those who have both purchased and used a good or service within a specific time period--time periods which range from three years for major durables to past week for reading a newspaper or currently having an account in one's own name for a bank. Conducting customer surveys for the American Customer Satisfaction Index requires screening randomly selected adults in sample households to find customers of a company such as JVC, which has about 1.3% of the market *of those who bought a TV or VCR in the past three years*, to the U.S. Postal Service with near universal daily use. ACSI screens for customers in an industry such as the cigarette industry. Smoking is down to 28% of the 21 year old and

over population and within that industry the need is to identify customers of three companies with market shares at the 56%, 18%, and 10% level. Or the problem is identifying past week readers of Gannett Company newspapers. Gannett has both the large national circulation *USA Today* but over 100 other newspapers in specific geographic markets, some of them quite small.

ACSI cannot use a single probability sample and let the customers fall as they do in the population. That would produce an enormous number of interviews for the U.S. Postal Service, the IRS, Campbell Soup Company, General Mills, or Procter & Gamble Company in order to get samples large enough to do modeling for Compaq Computer, JVC, or BMW. BMW is not exactly the people's car, nor is Volkswagen in the U.S.-- although the German name translates out to the "people's vehicle." Therefore, a quota of interviews is set for each company.

There is also a major complication to customer screening and identification when one is measuring companies like General Mills, Sara Lee, and Procter & Gamble--their customers don't know the names of the companies that produce the products they use! When a customer is asked what breakfast cereals he or she purchased and consumed in the past month, he or she comes up with a name like Cheerios. Cheerios is made by General Mills. And what woman names Sara Lee as the source of her Hanes pantyhose, or connects Duz, Era, Joy or Ivory to Procter & Gamble? Relatively few know the companies behind major consumer products.

These were the sampling and data collection challenges the National Quality Research Center at the University of Michigan Business School laid out in a Request for Proposal in early 1994. The plan was to conduct interviews in all 200 samples for seven economic sectors simultaneously for the first year baseline survey, then in subsequent years, break the sample into four quarterly samples updating 1-2 sectors per quarter. Those in a business school believe in free market competition and the Request for Proposal was a marketing challenge. Proposers were judged on quality, cost efficiency, the capability of managing a project of this scale and complexity, and willingness to work with the business school in developing a practically implementable final design for screening respondents to identify customers for the many products of the large number of organizations specified for measure. The project design required some unusual CATI (computer-assisted-telephone-interviewing) system programming.

Market Strategies, Inc. of Southfield, Michigan, came out ahead in what was a fairly close competition—the University of Michigan's Survey Research Center chose not to bid. Today, as the third year of the ACSI starts, it utilizes a sampling and field design which includes 48 replicate national samples annually, geographic regional oversamples, a dual frame of RDD plus list samples for the automotive industry, an unusual screening program which takes into account the incidence of use of the products and services of each industry and the market shares of measured companies within it, and allows for accumulation of short interviews with the customers of non-measured



companies into an "all other companies" category within a measured industry. Finally, a custom-designed CATI program, the ACSI Brand Extension Dictionary, links over 4,000 brands and brand extensions with their parent companies, assigning an interview to fulfill the company quota but inserting in the questionnaire used with the respondent the brand that customer names..

Let's run through the main features of the sampling, screening, customer identification, and interviewing program. The basis is RDD (random-digit-dial) sampling, but this is clearly a program "On Beyond RDD."

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FIGURE 5: RANDOM DIGIT DIAL METHODOLOGY--NATIONAL 48 REPLICATES

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For the baseline year, 1994, when all industries and companies were interviewed at once, a very large--200,000 plus household--sample was drawn and broken into 48 national replicates. Currently, two sectors and approximately one-fourth of companies are updated each quarter using 12 replicates. That way interviews about high incidence goods and services can be completed using one or two replicates while many successively used samples are needed to fill the interview quotas for products with low incidence of use from companies with small market shares.

ACSI measures some industries in which specific companies only operate in selected geographic areas.

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FIGURE 6: ACSI SAMPLE DESIGN: Geographically Targeted RDD Sample

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For the automotive industry only, customer satisfaction is measured for 19 companies or major divisions of companies, the smallest one having only 1.5% market share. For that industry, RDD sampling is supplemented with the use of purchased vehicle owner lists. A dual sample frame is maintained throughout interviewing for this industry, with daily checks that the list sample is producing interviews with respondents with demographic characteristics similar to the RDD sample.

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FIGURE 7: ACSI SAMPLE DESIGN: Sample Used for Automobile Owners

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Although only 200 companies are measured and modeled in the ACSI, for industry customer satisfaction indices it is important to have representation of smaller companies. Therefore, three satisfaction questions are administered to those who have bought the industry products being measured, but not from the measured companies.

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FIGURE 8: ACSI "SHORT" QUESTIONNAIRES

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Sample and completed interview management is complex. Respondents are screened for the products and services of no more than 10 industries of the 34 measured. When interviews for an industry are completed, a new one is added to the screener. For

efficiency, respondents are screened for low use products first. They are interviewed about a maximum of three companies. Company interview quotas can be filled by interviews from different industries, for those companies which operate in more than one. Demographics are asked only once of an individual respondent.

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FIGURE 9: ACSI CATI SYSTEM--REQUIREMENTS

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FIGURE 10: ACSI CATI INTERVIEW: Sequence

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FIGURE 11: ACSI INTERVIEW DESIGN: Product Screening Order

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FIGURE 12: COMPANY AND BRAND INCIDENCE FOR ACSI

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Development and use of the Brand Extension Dictionary is one of the most innovative features of ACSI. Here's how it works.

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FIGURE 13: ACSI BRAND EXTENSION DICTIONARY

FIGURE 14: ACSI BRAND EXTENSION DICTIONARY (2ND SLIDE)

FIGURE 15: ACSI BRAND EXTENSION DICTIONARY: EXAMPLE

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With 200 customer interview samples to manage at once, University of Michigan Business School and Market Strategies agreed that MSI should institute close

monitoring of the demographic profile of the completed interviews in each industry.

Here are aggregated results for 1994 and the first quarterly update following the baseline.

In actuality, however, the sample for each industry is watched daily during the field period and reported weekly to the University.

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FIGURE 16: SAMPLE COMPARISONS: ACSI CUSTOMERS

FIGURE 17: SAMPLE COMPARISONS (2ND SLIDE)

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The topic of "Maintaining Representative National Samples of Customers of 200 Companies in the Survey for the American Customer Satisfaction Index," ends here. However, there is interest in what the ACSI shows. Customer satisfaction is modeled by a set of weighted ratings asked on 1-10 scales. The Index itself is transformed to a 0-100 scale. In the baseline study, released in October 1994, the national customer satisfaction index representing the economy stood at 74.5.

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FIGURE 18: 1994 ACSI=74.5

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What could be determined initially was that U.S. consumers are more satisfied with manufacturing products than with services, and with private sector-supplied services than with government services.

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FIGURE 19: ACSI: Manufacturing, Services, Government

There was great variation in customer satisfaction with individual companies in the same industry.

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FIGURE 20: ACSI RANGE 1994: SELECTED INDUSTRIES

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Unhappily for both companies and the economy, customer satisfaction has declined in the second year of the ACSI, far more for services than for manufactured goods.

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FIGURE 21: CHANGES IN NATIONAL ACSI

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To date, individual company scores have been available only to companies which participate as corporate sponsors of the ACSI. That changes as of December 1995, when the ACSI becomes a *Fortune* magazine list with satisfaction scores published for all the measured companies. However, the modeling detail, and the scores of constructs in the model, other than the ACSI, remain available only to corporate sponsors who receive detailed reports on their own industries and their competitors in these.

ACSI uses a model which links customer satisfaction to customer loyalty, in the form of customer retention and price tolerance. Customer retention is a major determinant of profitability for a company. Hopefully, for individual companies and for

the economy, ACSI will become a tool for improving customer satisfaction and with it customer retention.



American Customer  
Satisfaction Index™

# Welcome to the American Customer Satisfaction Index (ACSI)



ACSI is co-sponsored by ASQC and the  
University of Michigan School of Business  
Administration



American Customer Satisfaction Index™

# ACSI: National Economy, Sectors and Industries

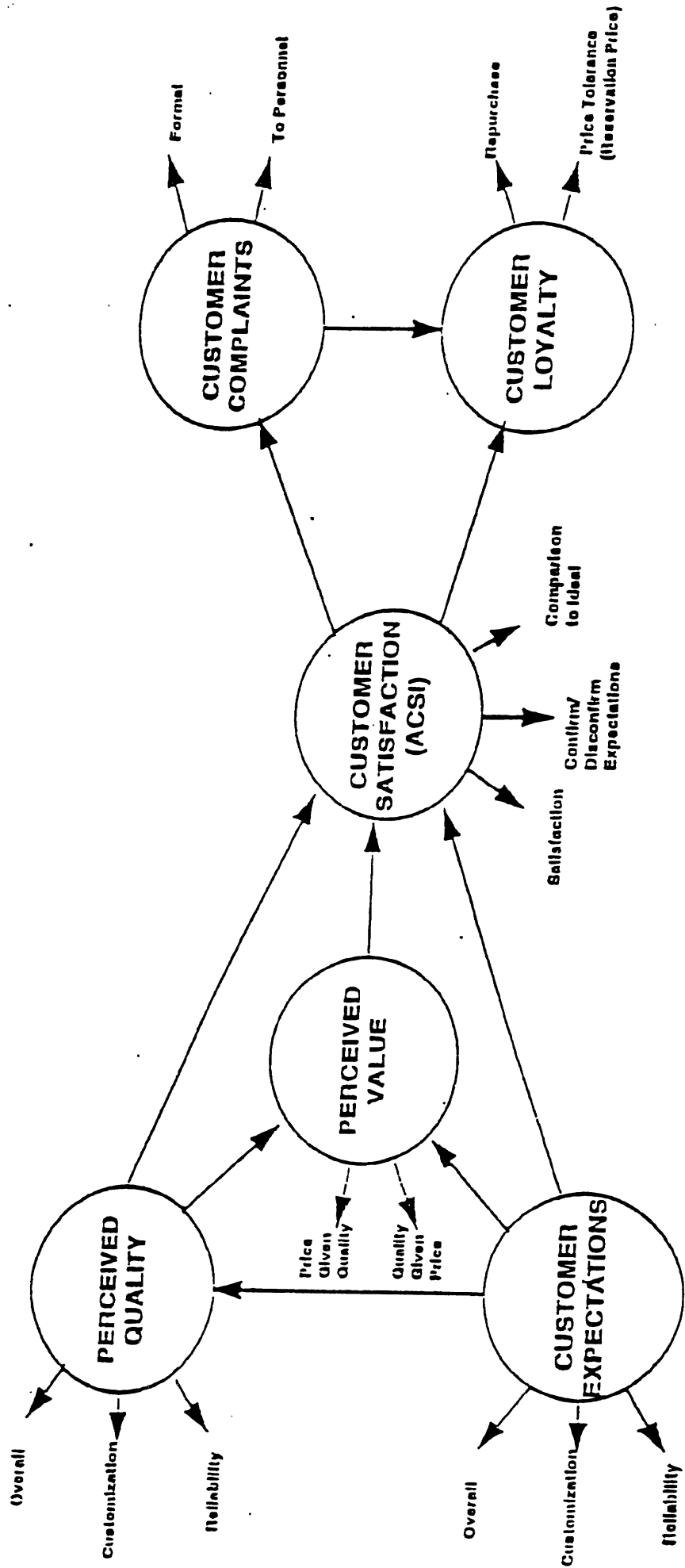
## ACSI

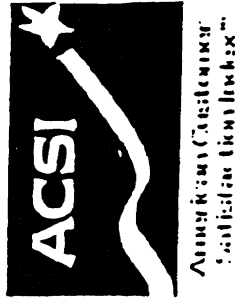
Manufacturing/ Nondurables	Manufacturing/ Durables	Transportation/ Communications/ Utilities	Retail	Finance/ Insurance	Services	Public Administration/ Government
8.2%	9.4%	8.8%	9.3%	6.8%	19.6%	12.6%
Apparel Athletic shoes Beer Cigarettes Food processing Gasoline Newspapers Personal care Soft drinks	Automobiles Consumer electronics Household appliances PC / Printers	Airlines Broadcasting/TV Electric service Express delivery Phone/local Phone/long-distance US Postal Service	Department stores Discount stores Restaurants/ fast food, Supermarkets	Banks/ commercial Insurance/life Insurance/ property	Hospitals Hotels Motion pictures	Solid waste (central city, suburb) Police (central city, suburb) IRS
\$665 B	\$582 B	\$472 B	\$392 B	\$277 B	\$106 B	\$62 B

Size of each of 7 sectors shown as % of GDP. Sales figures reflect total sales for the selected U.S. firms. Total sales of selected firms are 51% of GDP for these 7 sectors and 38% of national GDP.



# ACSI Model





# The Questions

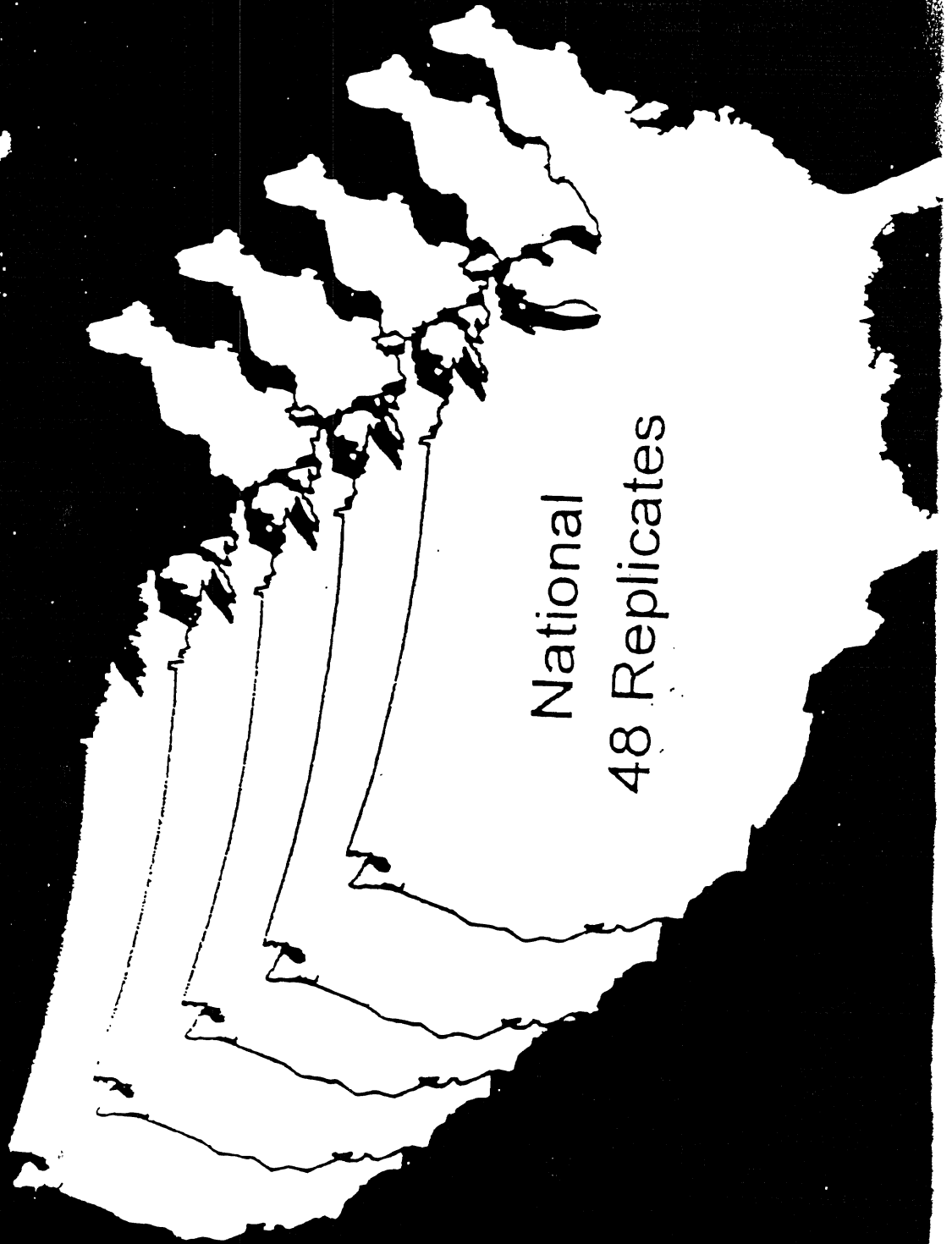
- Customer expectations
- Quality
- Value
- Customer satisfaction
- Customer loyalty
- Customer complaints

Figure 4

ACBI

# RANDOM DIGIT DIAL METHODOLOGY

National  
48 Replicates



# ACSI Sample Design

## Geographically Targeted RDD Sample

- ▶ Some Companies Only Operate In Selected Geographic Areas
  - Banks
  - Utilities
  - Newspaper Publishers
  - Hospitals
  - Some Retail Stores
  - Etc.
  
- ▶ National RDD Sample Is Inefficient And Unnecessary For These Companies

# **ACSI Sample Design**

## **Sample Used For Automobile Owners**

- ▶ **Only People Who Have Purchased (Not Leased) A New Vehicle Between Six Months and Three Years From Interview Date, And Still Own Vehicle, Are Eligible**
- ▶ **Automobile Purchasers Sampled From Dual Frame Design**
  - **RDD (As Part of Total ACSI Sample Frame)**
  - **List Sample Targeted Toward Brands**
- ▶ **Automobile Lists Are An Exception To The "Lists Aren't Very Good" Rule**
  - **States Require Vehicle Registration**

## ACSI "Short" Questionnaires

- ▶ One "Short" Questionnaire Maximum Per Respondent
- ▶ Three Questions
- ▶ Administered For Products Of Companies Not Measured in ACSI
- ▶ Only Administered If Respondent is Eligible For Less Than Three Products of Measured Companies
- ▶ Used For Overall Industry Sector Measurement

# **ACSI CATI System-- Requirements**

- ▶ Respondents Are Eligible To Fill Multiple Quota Cells
- ▶ Respondents Receive Only a Portion of Possible Screeners
- ▶ Company Quota Cells Can Be Filled By Multiple Products From Multiple Screeners
- ▶ Multiple Questionnaires
- ▶ Variable Number of Questionnaires
- ▶ Write Multiple Data Files From Each Interview
  - Company Questionnaire Information Written To Separate Data Files
  - Demographic Information Written To Multiple Data Files

# ACSI CATI Interview

## Sequence

- ▶ Introduction and Respondent Selection
  - Most Recent Birthday
  - Screen for 21 or Older if Beer or Cigarette Screeners are Open
- ▶ Screen for Up to Ten Products
  - Individual Purchase or Use
  - Specific Brands Used
- ▶ Administer Demographic Questionnaire if Eligible for Full Questionnaires
- ▶ Administer Up To Three Full Questionnaires
- ▶ Administer Short Questionnaires
- ▶ Ask Respondent Name for Validation



# ACSI Interview Design

- ▶ Product Screening Order
  - All Consumers Get Screened For Low Use Products Until Quota: Filled
  - Within Product Categories, Low Market Share Companies Have Priority Over High Market Share Companies
  - Consumers Only Get Screened For "Easy to Fill" Products After Failing to Qualify For "Hard to Fill" Companies
  - Program Allows Some Manipulation To Force Consumers Into "Easy to Fill" Products Before Interview Terminates

# COMPANY AND BRAND INCIDENCE FOR ACSI

EXAMPLE: Computer Equipment  
Overall Incidence = 30%

<u>Brand Name</u>	<u>Company Name</u>	<u>Market Share</u>
Compaq Deskpro	Compaq	2.6
Compaq LTE	Compaq	2.6
Compaq Portable	Compaq	2.6
Compaq SLT	Compaq	2.6
Apple II	Apple	4.6
Macintosh	Apple	4.6
Lite II	Apple	4.6
Laserwriter Plus	Apple	4.6
HP 110	Hewlett-Packard	10.9
HP Vectra LS	Hewlett-Packard	10.9
Deskwriter C	Hewlett-Packard	10.9
Thinkjet	Hewlett-Packard	10.9
PC JR	International Business Machines	41.0
Pearl	International Business Machines	41.0
ProPrinter	International Business Machines	41.0
Quietwriter	International Business Machines	41.0

# **ACSI Brand Extension Dictionary**

- ▶ **ACSI Brand Extension and Brand Dictionary**
  - Developed By MSI
  - Specialized Database Software Built Into CATI System
  - References "Brands and Their Companies" Database, Purchased From Gale Research, and Other Sources
  - Updated Annually
  - Over 4,000 Brand Extensions in Database
- ▶ **Product Dictionary Allows Brands From Multiple Screeners (Product Types) To Be Included in Parent Company Measurement**

# ACSI Brand Extension Dictionary

- ▶ Consumers Tell Interviewer Which Product They Purchased
- ▶ Dictionary Associates That Product With Parent Company
  - Quota Control by Parent Company
  - Inserts Product Name in Questionnaire But Inserts Parent Company Name (Code) in Data File
- ▶ "Other - Specify" Products Reviewed To Allow "Nick-Names" To Be Included In Dictionary

# ACSI Brand Extension Dictionary

**EXAMPLE: Food Processing - Cold Meats, Franks, Poultry**

## Brand Name

Armour  
Eckrich  
Golden Star Turkey  
Hebrew National  
Butcher's Best Poultry  
Flyers Chicken  
Holly Farms Bologna  
Louis Kemp  
Ball Park Franks  
Hillshire Sausage  
Jimmy Dean Sausage  
Little Sausages  
Big & Juicy Frankfurters

## Company Name

ConAgra  
ConAgra  
ConAgra  
ConAgra  
Tyson Food  
Tyson Food  
Tyson Food  
Tyson Food  
Sara Lee  
Sara Lee  
Sara Lee  
Sara Lee  
Kraft

**SAMPLE COMPARISONS**

**ACSI CUSTOMERS**

Baseline 1994      4th Qtr Update      1990 Census  
 Age 18-84      181,366,000

	n	%	12,230	%	181,366,000	%
<b>Age</b>						
18-34		30	32	38		
35-54		40	40	35		
55-64		30	28	28		

<b><u>Race/Ethnic</u></b>	%	%	%
White	87	86	82
Black	7	8	11
American Indian	1	1	1
Asian	2	2	3
Other	3	3	3
Hispanic (any race)	5	5	8

Figure 16

ACBI ★

**SAMPLE COMPARISONS  
CUSTOMER SAMPLE SKEWS ON SEX AND EDUCATION**

**ACSI CUSTOMERS**

**1990 Census  
Age 18-84**

**Baseline 1994    4th Qtr Update**

**SEX**

**Male**

**Female**

**%**

**37**

**63**

**%**

**38**

**62**

**%**

**48**

**52**

**Education**

**Less Than High School**

**High School Graduate**

**Some College**

**College Graduate**

**Post Graduate**

**%**

**6**

**30**

**30**

**22**

**12**

**%**

**7**

**30**

**31**

**21**

**11**

**%**

**25**

**30**

**25**

**13**

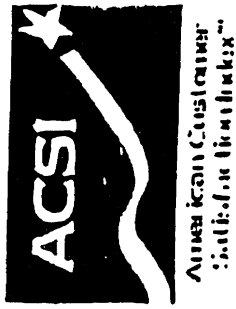
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**Median HH Income**

**\$35,030**

**\$37,280**

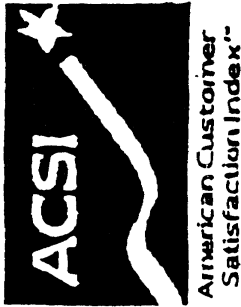
**\$30,056**



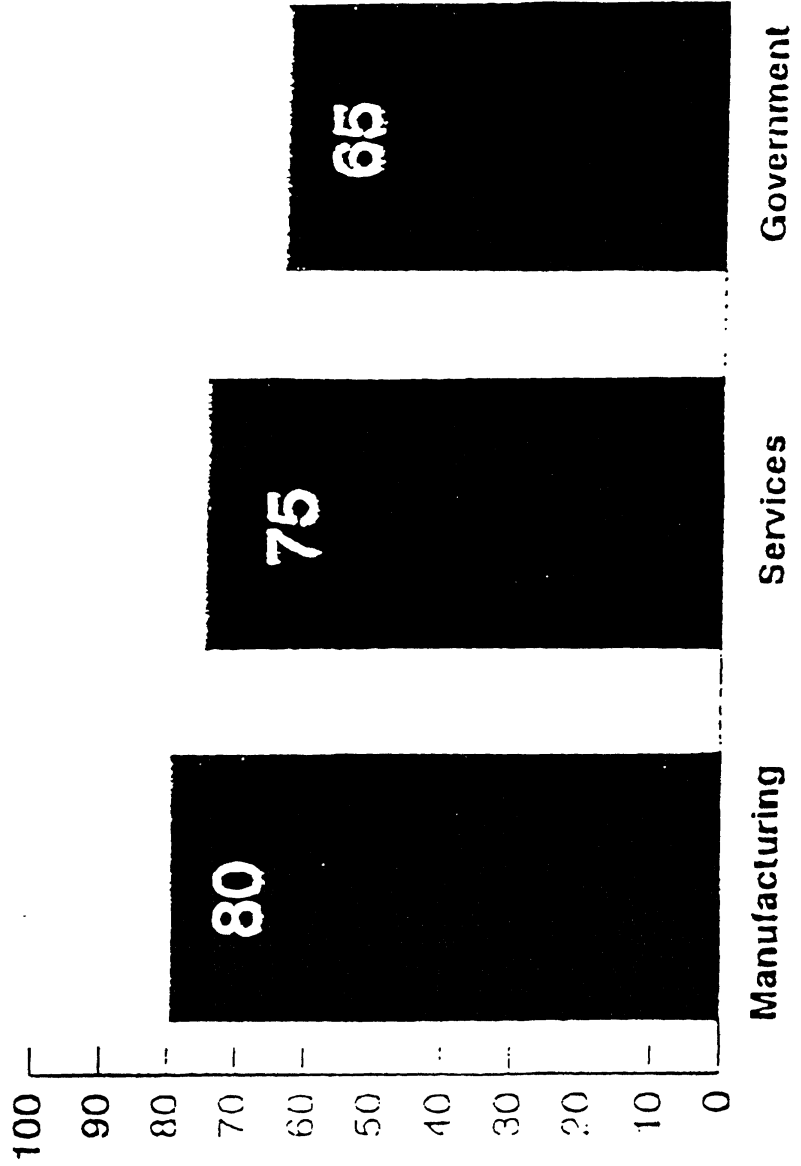
**1994 ACSI = 74.5**

**What Does This Mean?**





# ACSI



ACSI

# ACSI RANGE 1994 Selected Industries

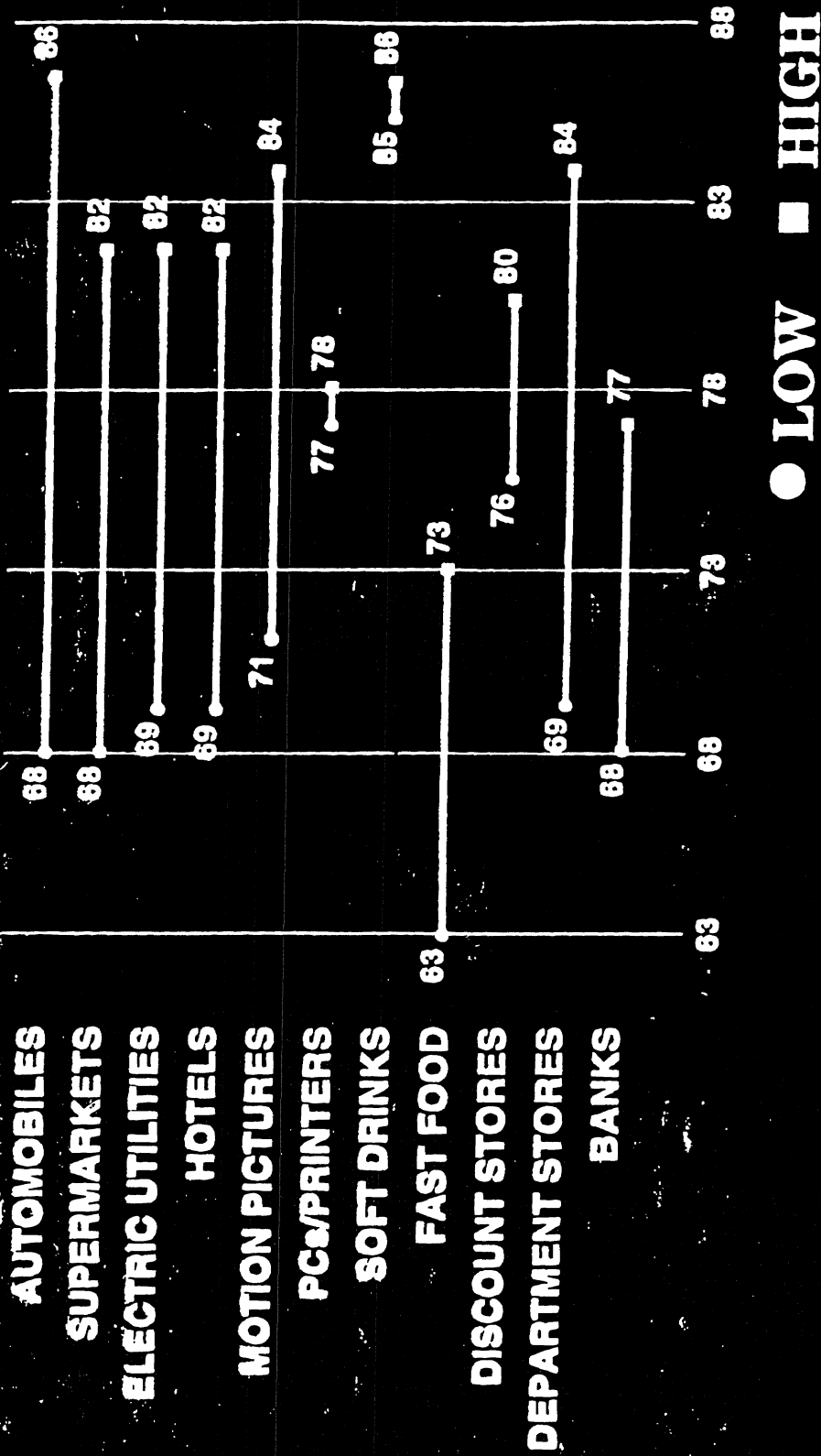


Figure 20

# Changes in National ACSI

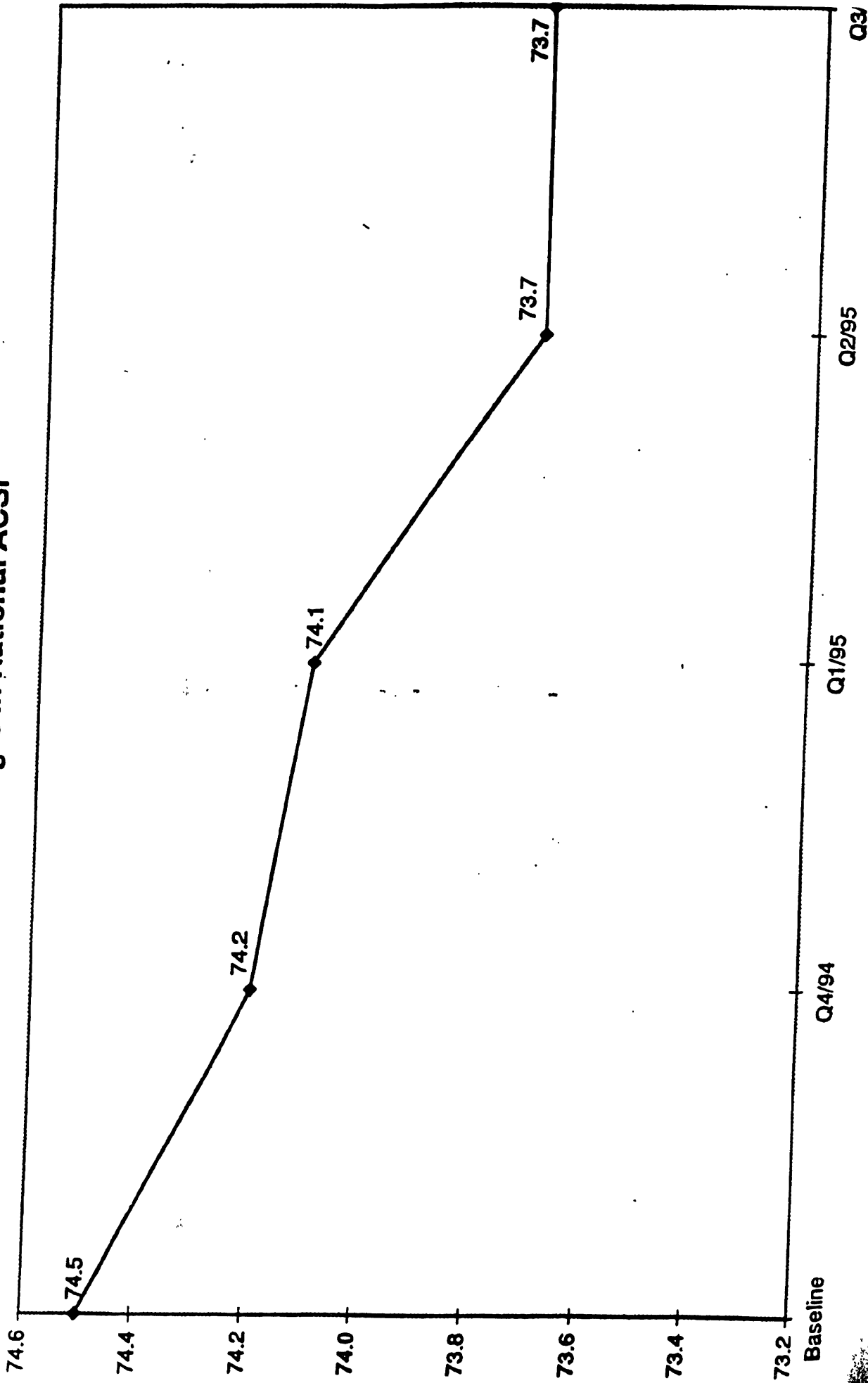


Figure 21