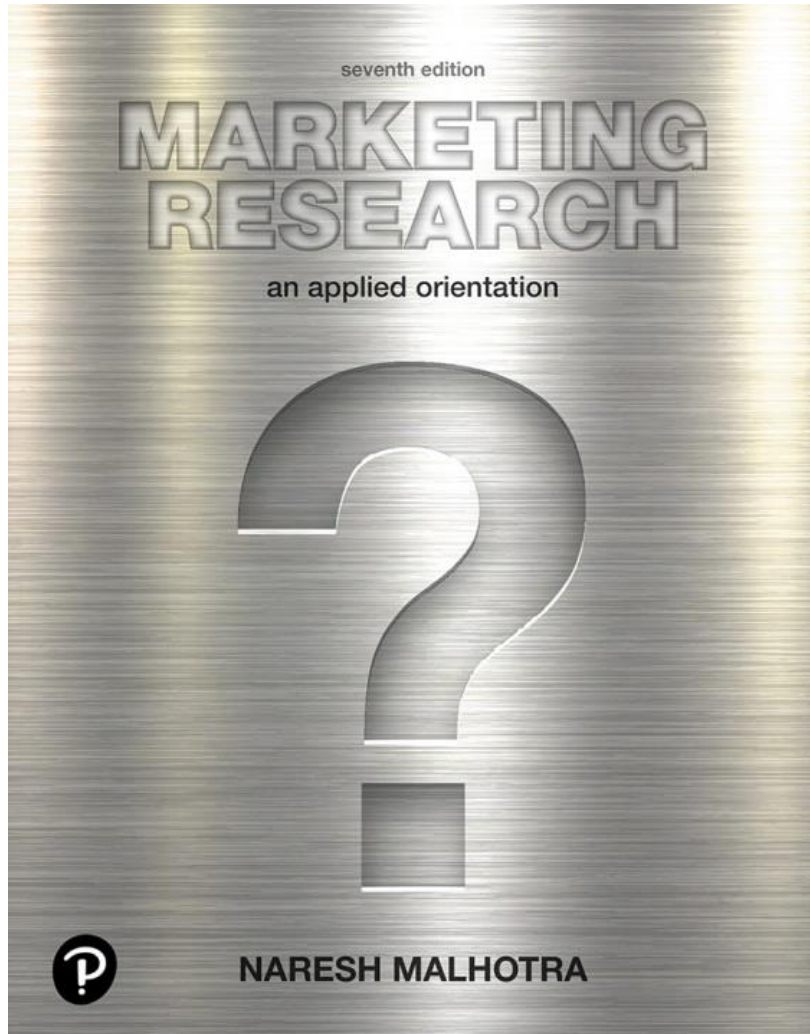


Marketing Research: An Applied Orientation

Seventh Edition



Chapter 8

Measurement and Scaling:
Fundamentals and
Comparative Scaling

Measurement and Scaling (1 of 2)

Measurement means assigning **numbers** or other **symbols** to characteristics of objects according to certain pre-specified rules.

- One-to-one correspondence between the numbers and the characteristics being measured.
- The rules for assigning numbers should be standardized and applied uniformly.
- Rules are invariant over objects or time.

Measurement and Scaling (2 of 2)

Scaling involves creating a continuum upon which measured objects are located.

Consider an attitude scale from 1 to 100. Each respondent is assigned a number from 1 to 100, with 1 = Extremely Unfavorable, and 100 = Extremely Favorable.

- Measurement is the assignment of a number from 1 to 100 to each respondent.
- Scaling is the process of placing the respondents on the **continuum** with respect to their attitude toward department stores.

Scale Characteristics (1 of 2)

Description

By description, we mean the unique labels or descriptors that are used to designate each value of the scale. All scales possess description.

Order

By order, we mean the relative positions of the descriptors. Order is denoted by descriptors such as greater than, less than, and equal to.

Scale Characteristics (2 of 2)

Distance






The characteristic of distance means that **absolute differences** between the scale descriptors are known and may be expressed in units.

Origin

The origin characteristic means that the scale has a unique or **fixed beginning** or true zero point.

Primary Scales of Measurement (1 of 2)

Figure 8.1 An Illustration of Primary Scales of Measurement

Scale					
Nominal	Numbers Assigned to Runners				Finish
Ordinal	Rank Order of Winners				Finish
Interval	Performance Rating on a 0-to-10 Scale	8.2	9.1	9.6	
Ratio	Time to Finish, in Seconds	15.2	14.1	13.4	

Primary Scales of Measurement (2 of 2)

Table 8.1 Primary Scales of Measurement

				Permissible Statistics	
Scale	Basic Characteristics	Common Examples	Marketing Examples	Descriptive	Inferential
Nominal	Numbers identify and classify objects	Social Security numbers, numbering of football players	Brand numbers, store types, Gender	Percentages, mode	Chi-square, binomial test
Ordinal	Numbers indicate the relative positions of the objects but not the magnitude of differences between them	Quality rankings, rankings of teams in a tournament	Preference rankings, social class	Percentile, median	Rank-order correlation
Interval	Differences between objects can be compared; zero point is arbitrary	Temperature (Fahrenheit, centigrade)	Attitudes, opinions	Range, mean, standard deviation	Product-moment correlations, t-tests, ANOVA, regression, factor analysis
Ratio	Zero point is fixed; ratios of scale values can be computed	Length, weight	Age, income, costs, sales, market shares	Geometric mean, harmonic mean	Coefficient of variation

Primary Scales of Measurement

Nominal Scale

- The numbers serve only as labels or tags for identifying and classifying objects.
- When used for identification, there is a strict one-to-one correspondence between the numbers and the objects.
- The numbers do not reflect the amount of the characteristic possessed by the objects.
- The only permissible operation on the numbers in a nominal scale is counting.
 - Statistics based on frequency counts, e.g., percentages and mode.

Illustration of Primary Scales of Measurement

Table 8.2 Illustration of Primary Scales of Measurement

	Nominal Scale	Ordinal Scale		Interval Scale		Ratio Scale
No.	Store	Preference Rankings		Preference Ratings		\$ Spent Last 3 Months
				1–7	11–17	
1.	Nordstrom	7	79	5	15	0
2.	Macy's	2	25	7	17	200
3.	Target	8	82	4	14	0
4.	Kohl's	3	30	6	16	100
5.	JCPenney	1	10	7	17	250
6.	Neiman-Marcus	5	53	5	15	35
7.	Marshalls	9	95	4	14	0
8.	Saks Fifth Avenue	6	61	5	15	100
9.	Dillard's	4	45	6	16	0
10.	Wal-Mart	10	115	2	12	10

Primary Scales of Measurement

Ordinal Scale

- A ranking scale in which numbers are assigned to objects to indicate the **relative extent** to which the objects possess some characteristic.
- Can determine whether an object has more or less of a characteristic than some other object, but not how much more or less.
- Any series of numbers can be assigned that preserves the ordered relationships between the objects.
- In addition to the counting operation allowable for nominal scale data, ordinal scales permit the use of statistics based on centiles, e.g., percentile, quartile, median.

Primary Scales of Measurement

Interval Scale

- Numerically equal distances on the scale represent equal values in the characteristic being measured.
- It permits comparison of the differences between objects.
- The location of the zero point is not fixed. Both the zero point and the units of measurement are arbitrary.
- Any positive linear transformation of the form $y = a + bx$ will preserve the properties of the scale.
- Statistical techniques: all of those that can be applied to nominal and ordinal data, the arithmetic mean, standard deviation

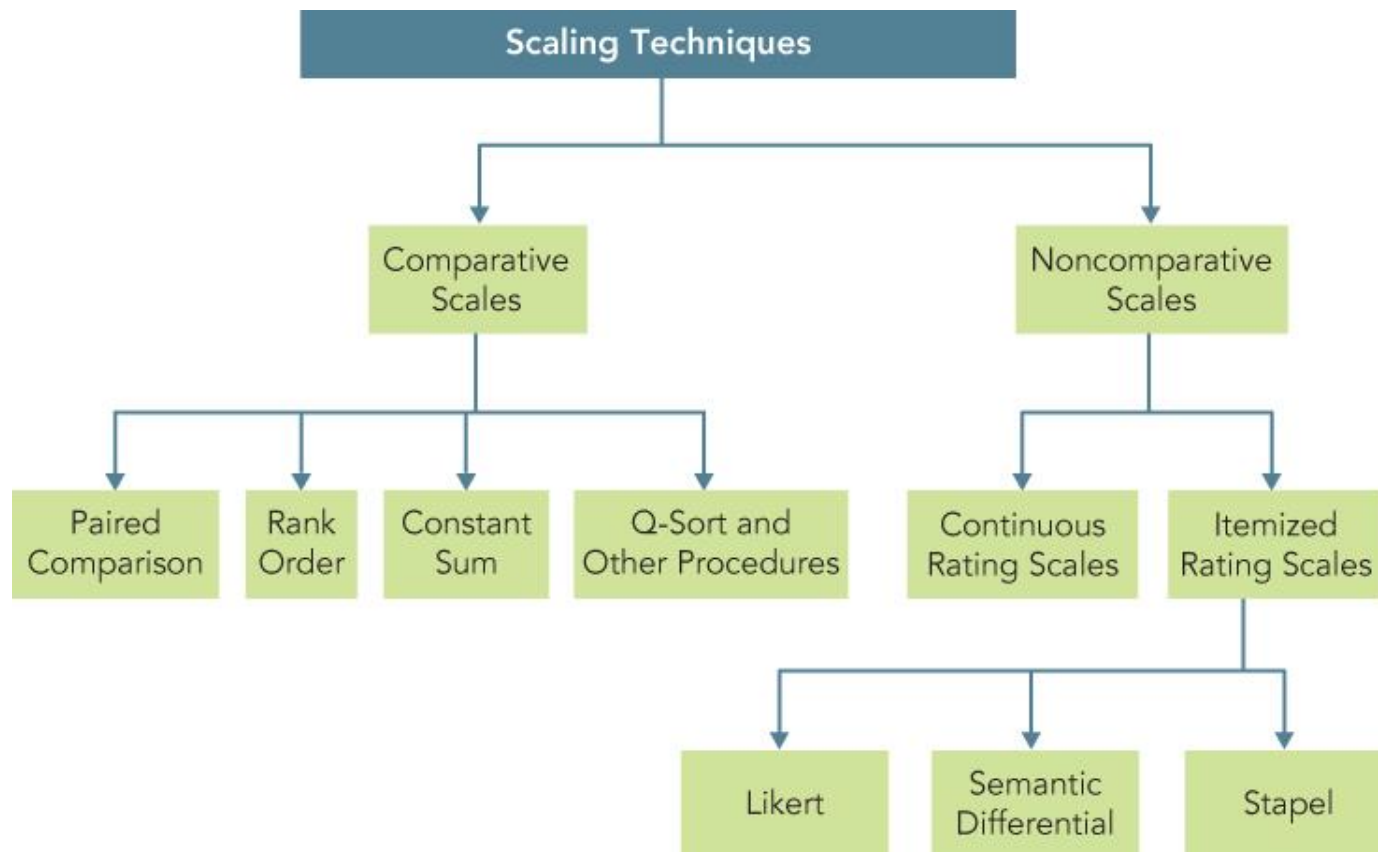
Primary Scales of Measurement

Ratio Scale

- Possesses all the properties of the nominal, ordinal, and interval scales.
- It has an absolute zero point.
- It is meaningful to compute ratios of scale values.
- Only proportionate transformations of the form $y = bx$, where b is a positive constant, are allowed.
- All statistical techniques can be applied to ratio data.

A Classification of Scaling Techniques

Figure 8.2 A Classification of Scaling Techniques



A Comparison of Scaling Techniques

- **Comparative scales** involve the direct comparison of stimulus objects. Comparative scale data must be interpreted in relative terms and have only ordinal or rank order properties.
- In **noncomparative scales**, each object is scaled independently of the others in the stimulus set. The resulting data are generally assumed to be interval or ratio scaled.

Relative Advantages of Comparative Scales

- Small differences between stimulus objects can be detected.
- Same known reference points for all respondents.
- Involve fewer theoretical assumptions.
- Tend to reduce halo or carryover effects from one judgment to another.

Relative Disadvantages of Comparative Scales

- Ordinal nature of the data
- Inability to generalize beyond the stimulus objects scaled

Comparative Scaling Techniques Paired Comparison Scaling

- A respondent is presented with two objects and asked to select one according to some criterion.
- The data obtained are ordinal in nature.
- Paired comparison scaling is the most widely used comparative scaling technique.
- With n brands, $[n(n - 1) / 2]$ paired comparisons are required.
- Under the assumption of transitivity, it is possible to convert paired comparison data to a rank order.

Obtaining Shampoo Preferences Using Paired Comparisons

Figure 8.3 Obtaining Shampoo Preferences Using Paired Comparisons

Instructions

We are going to present you with 10 pairs of shampoo brands. For each pair, please indicate which one of the two brands of shampoo in the pair you would prefer for personal use.

Recording Form

	<i>Jhirmack</i>	<i>Finesse</i>	<i>Vidal Sassoon</i>	<i>Head & Shoulders</i>	<i>Pert</i>
Jhirmack		0	0	1	0
Finesse	1 ^a		0	1	0
Vidal Sassoon	1	1		1	1
Head & Shoulders	0	0	0		0
Pert	1	1	0	1	
Number of times preferred ^b	3	2	0	4	1

^aA 1 in a particular box means that the brand in that column was preferred over the brand in the corresponding row. A 0 means that the row brand was preferred over the column brand.

^bThe number of times a brand was preferred is obtained by summing the 1's in each column.

Paired Comparison Selling

The most common method of taste testing is paired comparison. The consumer is asked to sample two different products and select the one with the most appealing taste.

A blind taste test for a soft drink, where imagery, self-perception and brand reputation are very important factors in the consumer's purchasing decision, may not be a good indicator of performance in the marketplace.

A paired comparison
taste test

Comparative Scaling Techniques Rank Order Scaling

- Respondents are presented with several objects simultaneously and asked to order or rank them according to some criterion.
- It is possible that the respondent may dislike the brand ranked 1 in an absolute sense.
- Rank order scaling results in ordinal data.
- Only $(n - 1)$ scaling decisions need be made in rank order scaling.

Preference for Toothpaste Brands Using Rank Order Scaling

Figure 8.4 Preference for Toothpaste Brands Using Rank Order Scaling

Instructions

Rank the various brands of toothpaste in order of preference. Begin by picking out the one brand that you like most and assign it a number 1. Then find the second most preferred brand and assign it a number 2. Continue this procedure until you have ranked all the brands of toothpaste in order of preference. The least preferred brand should be assigned a rank of 10.

No two brands should receive the same rank number.

The criterion of preference is entirely up to you. There is no right or wrong answer. Just try to be consistent.

Brand	Rank Order
1. Crest	_____
2. Colgate	_____
3. Aim	_____
4. Tom's	_____
5. Sensodyne	_____
6. Ultra Brite	_____
7. Close Up	_____
8. Pepsodent	_____
9. Plus White	_____
10. Stripe	_____

Comparative Scaling Techniques

Constant Sum Scaling

- Respondents allocate a constant sum of units, such as 100 points to attributes of a product to reflect their importance.
- If an attribute is unimportant, the respondent assigns it zero points.
- If an attribute is twice as important as some other attribute, it receives twice as many points.
- The sum of all the points is 100. Hence, the name of the scale.

Importance of Bathing Soap Attributes Using a Constant Sum Scale

Figure 8.5 Importance of Toilet Soap Attributes Using a Constant Sum Scale

Instructions			
Below are eight attributes of toilet soaps. Please allocate 100 points among the attributes so that your allocation reflects the relative importance you attach to each attribute. The more points an attribute receives, the more important the attribute is. If an attribute is not at all important, assign it zero points. If an attribute is twice as important as some other attribute, it should receive twice as many points.			
Form			
Attribute	Average Responses of Three Segments		
	Segment I	Segment II	Segment III
1. Mildness	8	2	4
2. Lather	2	4	17
3. Shrinkage	3	9	7
4. Price	53	17	9
5. Fragrance	9	0	19
6. Packaging	7	5	9
7. Moisturizing	5	3	20
8. Cleaning power	13	60	15
Sum	100	100	100