# An Index of Consumer Satisfaction

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Outlines a method to determine the relative level of consumer satisfaction with goods and services.

## General Description

The demand for consumer satisfaction information from both the public and private sector is increasing. Knowing how the various segments of the population feel -- their attitudes and frustrations -- is increasingly necessary for the development of farsighted corporate and public policy. Sources of consumer dissatisfaction are not static. Rather, they require periodic monitoring since they may stem from changes in consumer values, attitudes, and expectations as well as from physical characteristics of products and services.

To date, there has been no systematic attempt to periodically monitor a wide cross section of consumers as to their relative level of satisfaction with goods and services supplied by either the private or public sector. While the interplay of market forces is generally relied upon to match market alternatives to consumer preferences, rising consumer restlessness and complaints indicate that in many cases, traditional market signals are either not sufficiently sensitive, inadequately communicated, or are misinterpreted. The Index of Consumer Satisfaction (ICS) attempts to supplement traditional market signals with direct feedback from consumers. (1)

Recent statistical techniques such as nonmetric scalling are utilized to formulate social indicators of market performance. The ICS is based on respondents' own evaluation of their satisfaction with various products and services provided by our market economy. The proposed measure would indicate how consumers perceive their satisfaction with specific products and product attributes. It would also indicate how satisfaction or dissatisfaction is distributed across various socioeconomic groups and provide a means of monitoring changes over time.

The ICS focuses on performance at the market or product level rather than at the individual brand level. It reflects the "social mechanism" perspective of market systems which considers both economic and noneconomic results. Social and cultural values, as well as economic factors, influence expectations, and thus satisfaction, with products and services. Thus, a greater awareness and concern with problems of ecology could decrease a person's expressed satisfaction with a product, even though the performance of the product itself remains unchanged. Responsiveness becomes an important performance dimension given this dynamic perspective of market systems. The ICS as a performance measure would provide empirical information concerning the responsiveness of the market to consumer dissatisfaction and to social and cultural change.

The performance norm or theoretical ideal for this measure would be the elimination of expressed dissatisfaction. Dissatisfaction can be reduced by making product and service improvements, providing new products to fill market voids, or by a shift in consumer expectations. In a dynamic environment, this ideal is not likely to be attained, but is a desirable direction in which to move.

## Index Formulation

Procedures for collecting satisfaction scores and constructing indicies of consumer satisfaction are being tested in a USDA pilot study initiated in 1971. The purpose of the pilot study is to test and refine methodology suitable for constructing indicies of consumer satisfaction from national surveys. Indicies can be developed for overall satisfaction with a market basket of products or services, such as for food; for individual product classes, meat, for instance; and for individual products, for example, beef. The overall Index of Consumer Satisfaction is thus representative of a set of subindicies that can be computed for different groups of respondents and geographic regions, for individual products, and for product classes. In many cases of policy application, the subindicies would be more useful since the aggregate overall index would hide contradictory tendencies in the subcomponents.

In computing the ICS, it is assumed that consumers select from market alternatives that product which conforms most closely to the mix of attributes (price, quality, etc.) they perceive as important. Their overall satisfaction with the product will be determined by their satisfaction with the attributes. However, some attributes probably influence overall product satisfaction more than others.

Empirical data for the ICS consists of scores that measure consumer satisfaction with particular products and their attributes, with product classes, and with an overall market basket. Satisfaction is measured on a five-point scale ranging from "very satisfied" (A) to "not at all satisfied" (E). Letters, rather than numbers, are used in order to avoid suggesting a specific quantitative relationship between points on the scales.

Two different methods are used in arriving at scores for individuals; (a) raw scores (RS) and, (b) optimal monotonic scores (OMS). Using raw scores (assigning numbers one through five to the letters A through E) assumes positions on the scale are equally spaced. It implies that respondents perceive a movement from point two to point one as equally easy -- or difficult -- as a movement from point three to point four.

A second scaling system (OMS) is also used to obtain satisfaction scores. (2) This technique does not presuppose equidistant spacing between adjacent points on the scale. It allows intervals between points on the scale to be stretched (or shortened), while maintaining their order, so as to maximize either the average correlation among the items scaled (in this case a product and its attributes). Rescaling the original raw scores (one through five) into DMS scores also maximizes the average correlation between a dependent variable (for example, a product satisfaction score) and a set of predictors (in this case, product attribute scores). This process greatly facilitates aggregation of scores across products and persons.

The OMS scaling procedure was used to analyze the USDA pilot study. Scales for one of the products included in the study, luncheon meat, and 5 preselected product attributes, are shown in Table 1 to illustrate the technique. In this instance, a seven point scale was used. Both the RS satisfaction scale and the OMS satisfaction scales are shown in order to compare results.[1]

The intervals in the OMS scales appeared quite different from those in the RS scale. This difference occurred because raw attribute scores were rescaled, thus maximizing the average correlation among these five attributes. Both the RS and OMS scores indicated that these respondents were most dissatisfied with the price of luncheon meats (RS mean of 4.39) and most satisfied with the availability (RS mean of 2.32).

The OMS scales are useful in comparing relative levels of satisfaction when absolute comparisons would be difficult. It is questionable whether reporting being "very satisfied" (raw score 1) with price and with availability really mean the same thing, and whether they should therefore be denoted by the same score. For example, being "very satisfied" with the price of luncheon meat is indicated by a score of 2.65, whereas being "very satisfied" with availability is denoted by a score of 1.27.

Table 1

RS and OMS Values for Luncheon Meat and Five Attributes

| RS Scale | OMS Satisfaction Scale for Selected Items: Luncheon Meat | Packaging | Taste | Nutritional Value | Availability | Price |
|---|---|---|---|---|---|---|
| 1 | 1.70 | 1.45 | 1.48 | 1.59 | 1.27 | 2.65 |
| 2 | 2.48 | 2.38 | 2.44 | 2.46 | 2.36 | 3.13 |
| 3 | 3.14 | 3.06 | 3.11 | 3.15 | 3.03 | 3.71 |
| 4 | 3.75 | 3.62 | 3.58 | 3.71 | 3.51 | 4.20 |
| 5 | 4.06 | 4.08 | 3.95 | 4.13 | 3.97 | 4.68 |
| 6 | 4.48 | 4.34 | 4.31 | 4.56 | 4.22 | 5.05 |
| 7 | 5.00 | 4.79 | 4.81 | 5.05 | 4.60 | 5.80 |
| RS Mean | 2.98 | 2.63 | 2.67 | 2.97 | 2.32 | 4.39 |

The higher value for price results from only a few respondents checking the category "very satisfied", and because mean satisfaction with price (4.39 in terms of raw scores) was relatively low compared with that for availability (2.32).

The "product" satisfaction scale, in this case for luncheon meat, is developed by transforming raw product satisfaction scores to a set of OMS satisfaction scores via a form of regression analysis in which satisfaction for each product is "best" predicted by its attributes. A set of raw satisfaction scores for each product was the dependent variable, with OMS scaled attributes the independent variables. Each person must implicitly have some kind of model by which evaluations of the individual attributes are put into an overall judgment about the entire product. The problem of finding the appropriate composition model is, therefore, one of estimating for a person or group the weight that is subjectively associated with particular attributes in arriving at judgments of overall product satisfaction.

OMS scales for each product is computed by equation (1).

$$(1) \quad p_{ik} = \sum_{j=1}^{n} \beta_j \; a_{ijk} + e_{ik}$$

Where:

$p_{ik}$ = the OMS scale for products, i.e., the column labeled "luncheon meat" in Table 1, (i=1,2,...,N observations; k=1,2,...,m products)

$\beta_j$ = beta (importance) weights for j=1,2, ..., attributes

$a_{ijk}$ = set of OMS satisfaction scores for attributes of products i=1,2,...,N observations; j-1,2,...,n attributes; k=1,2,...,m products

$e_{ik}$ = the residual or error component for individual i on product k.

In the above equation, the beta weights for the five attributes in computing the OMS product scale for luncheon meat are: .06 (packaging), .60 (taste), .13 (nutritional value), .02 (availability) and .11 (price). For luncheon meat, the attribute "taste" overshadows all other attributes in explaining consumer satisfaction.

Every person's satisfaction score for any given product can be recomputed from these scales. For example, a respondent may have checked letter "A" on the seven-point A to G satisfaction scale used in the questionnaire in expressing his satisfaction with the product. This person's score

would be translated to 1.70 (taken from column 2, Table 1), and so on, for the other respondents. Satisfaction over all respondents with luncheon meat would be determined by the mean of all the OMS satisfaction scores for this product. The Index of Consumer Satisfaction for any single product, k, is thus computed by:

$$(2) \quad ICS_k = \frac{1}{N} \sum_{i=1}^{N} p_{ik}$$

Where: $p_{ik}$ = The OMS scale i=1,2,...,N observations; k=1 product.

As an example, assume four people are surveyed concerning their satisfaction with luncheon meat. They indicate their respective degree of satisfaction by checking letters "A", "D", "F", and "B", on a seven-point scale. From the OMS product satisfaction scale in Table 1, these scores are given the respective values of 1.70, 3.75, 4.48, and 2.48. In this hypothetical example, the ICS for luncheon meat across all respondents would be:

$$ICS_k = \frac{1}{4} \sum_{i=1}^{4} (1.70 + 3.75 + 4.48 + 2.48) = 3.10$$

Where k = the product luncheon meat

This procedure can be generalized to product class and finally to overall market basket satisfaction ratings. Product class satisfaction is viewed as a weighted sum of satisfaction with products within the product class. The composition model for product class satisfaction is:

$$(3) \quad c_i = \sum_{k=1}^{m^*} \beta_k \, p_{ik\ell} + e_{i\ell}$$

Where:

$c_{i\ell}$ = transformation of raw satisfaction scores to a set of scaled (OMS) satisfaction scores for each product class, the dependent variable, such that satisfaction with each product class is "best" predicted by satisfaction with its associated products; (i=1,2,...,N observations; $\ell$ = 1,2, ...,M product classes)

$m^*$ = number of products in a particular product class $\ell$

$\beta_k$ = beta weights for k=1,2,...,m products

$p_{ik\ell}$ = OMS satisfaction scores for each person for each product within a particular product class

$e_{i\ell}$ = error component.

As with products, the index of consumer satisfaction for each product class, such as meat, is represented by the mean satisfaction score of all respondents (based on the OMS satisfaction scale for each product class computed by formula (3) above):

$$(4) \quad ICS_\ell = \frac{1}{N} \sum_{i=1}^{N} c_{i\ell}$$

In like manner, OMS satisfaction scales for the overall market basket, are computed from a weighted sum of satisfaction with the individual product classes. The overall or market basket satisfaction scale on which individual responses are recorded is computed by:

$$(5) \quad o_i = \sum_{\ell=1}^{M} \beta_\ell \, c_{i\ell} + e_i$$

Where:

$o_i$ = OMS satisfaction scale for the overall market basket (i=1,2,...,N observations; $\ell$ =1,2,...,M product classes)

$e_i$ = error component.

The index of consumer satisfaction for the food market basket for all respondents is:

$$(6) \quad ICS_{(food)} = \frac{1}{N} \sum_{i=1}^{N} o_i$$

In many instances, we may wish to know how satisfaction differs between particular subsets of the sample based on various socioeconomic criteria. The ICS can be computed for a particular subset of

individuals at each level of aggregation (product, product class, or market basket). Thus, average satisfaction of white-collar workers with product class $\ell$ is:

$$(7) \quad ICS_{g\ell} = \frac{1}{N^*} \sum_{i=1}^{N^*} c_{i\ell}$$

Where:

$N^*$ = the number of respondents in a particular group ($g=1,2,\ldots,r$) in this case, g= white collar workers.

In addition, to facilitate comparisons over time, the profile of consumer satisfaction indicies at each level of aggregation can be normalized at t=o to 100. Future movements of the indicies can then be recorded as deviations from the base period score of 100.

Summary

Testing the procedures described above in the USDA pilot test indicated the methodology is technically feasible and produces meaningful results. Correlations were performed between consumer satisfaction scores and other general socioeconomic characteristics; such as income level, education level, and general personality traits. On the whole, these "external" variables showed very weak patterns of association with mean consumer satisfaction scores. While these results do not deny the possibility of significant difference between subgroups defined on the basis of these variables, they do suggest that consumer satisfaction is relatively independent of attitudinal and general personality factors. This result strengthens the meaningfulness of these indicies. It indicates that satisfaction with market goods and services can be measured without being a surrogate of general optimism or pessimism, or other general traits.

The ICS would provide an additional perspective or dimension to balance traditional economic, accounting, and engineering measures of market performance. In effect, it measures the perceived extent to which product and service alternatives desired by consumers are not incorporated into any specific choice in the market place.

On a macro basis, the ICS can be viewed as a social indicator reflecting, over time, changes in satisfaction with specific and general aspects of our market economy. Increased experience with movements in the indicies may help identify or predict buying trends, and may also be indicative of potential consumer unrest.

As measures such as the ICS come into use, there will be serious questions of interpretation. Greater experience with indicies of consumer satisfaction is needed to answer questions concerning their sensitivity. How stable are responses over time? How sensitive are aggregate satisfaction scores to changes in the specific products included in the survey? In addition, consumer satisfaction (in as much as it reflects consumer sovereignty) has limitations as a goal. Individual consumer preferences, in some cases, may have to be restricted or disallowed if long run social costs outweigh private benefits.

Compared to existing measures of market performance, the ICS is a very comprehensive measure. The full range of market activities come under evaluation. It incorporates a number of "marketing variables" often ignored by other measures. In general, the technical and economic feasibility of the ICS has been demonstrated, it provides worthwhile information and has a number of potential users. The pilot study empirically investigated subjective satisfaction at only one point in time and for a very small number of items and sample of individuals. These results need to be extended over time and for larger samples before the ICS becomes operational on a broader basis.

Literature Cited

(1) This approach is under development by the Economic Research Service, U.S. Department of Agriculture, together with Martin Pfaff, Professor of Economics, Wayne State University. For a more detailed discussion of this research, see series of papers on Consumer Satisfaction published in: M. Venkatesan, ed. Proceedings of Association for Consumer Research - 1972. Iowa City:

Association for Consumer Research Conference, University of Iowa, 1973; and U.S. Department of Agriculture, Economic Research Service, The Index of Consumer Satisfaction (ICS), Interim Report of Contract No. 12-17-05-1-610, unpublished report.

(2) For a more detailed discussion of multidimensional scaling, see: Lingoes, J.C., "A General Survey of the Guttman-Lingoes Nonmetric Program Series", In: Shepard, R., Romney, A.K., and Nerlove, S., (Eds.), Multidimensional Scaling: Theory and Applications in the Behavioral Sciences, Seminar Press, Vol. I, 1972, pp. 49-68.

[1] The OMS procedure yields values whose mean (across all respondents) is zero and whose variance is unity. Therefore, to facilitate comparison over time, the respective means for luncheon meat and the attributes based on raw scores, have been added in. The mean response of the 342 respondents in the pilot study with luncheon meat satisfaction based on raw scores was 2.98, for packaging the mean response was 2.63, etc.

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