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1. Introduction

Research in social indicators has been public now for nearly a decade, since the release of the Bauer (1966) volume which was the first to use the label. Roughly, as Land (1974b) has noted, it is now generally agreed that social indicators are statistics which measure social conditions or activities and changes therein over time for various segments of a population. By social conditions, it is meant both the external (social and physical) and the internal (subjective and perceptual) contexts of human existence in a given society. This definition is a highly general characterization of social indicators, for it allows almost any index of social activity to be classified as a social indicator provided that the index can be construed as reflecting a social condition of some population. For example, if an index such as the "sex ratio" of a population is construed as reflecting some condition of life in that population, then it could be regarded as a social indicator by this definition. Since social indicators have been considered to be generalizations of economic indicators and since economic indicators are just indexes of economic conditions or activities, this characterization is appropriate. It gives a general and somewhat permeable cognitive orientation to the notion of a social indicator.

Nevertheless, as Land (1974b) observes, it is useful to have a more stringent external validity criterion for classifying a social statistic as a social indicator in order that the definition may be made more precise. Two such criteria have been proposed in the social indicators literature.

First, social planners and policymakers (see, e.g., Executive Office of the President, Office of Management and Budget, 1974; Organization for Economic Cooperation and Development, 1973; Terleckyj, 1972; U.S. Department of Health, Education and Welfare, 1969) generally require that social indicators be arguments in a social welfare function, where this function is taken to be some combination of the utility (satisfaction) functions of the members of the society which, in turn, depend upon the conditions of life indexed by the social indicators. This criterion reduces social indicators to goal output indicators, as they can be taken to measure the degree of achievement of a goal objective in a social welfare function.

A second criterion, usually associated with social scientists rather than social planners (see, e.g., Campbell and Converse, 1972; Land and Spilerman, 1974; Sheldon and Moore, 1968), requires that social indicators demonstrate a consistent historical pattern of timing and covariation with social change. This criterion leads to the class of indicators of social change. Certainly, it is not necessary for the list of goal output indicators to be identical to the list of

indicators of social change. In fact, it is very difficult for a meaningful social welfare function to take into account more than a few aspects of social life. But the contents and relative weights of social welfare functions will undoubtedly change from time to time as the interests of members of a society and of policymakers change. As this occurs, social scientists will be called upon to provide different indicators as components of the welfare function. Ideally, these indicators will be derivable from a general list of "indicators of social change," a list which has been verified to satisfy the external validity criterion of social indicators which is distinct from the "design" or "planning" function associated with social policy.

It is readily seen that these two criteria and the corresponding types of indicators are generalizations of the two main criteria of external validity which have been employed in the standard economic indicators. First, with respect to economic "analysis," economic indicators are just defined as time series that have shown a historical, consistent pattern of timing and of conformity to business cycles (G. Moore, 1961; 1967). Second, from the perspective of economic "design" or "policy," economic indicators are components of economic welfare (see, e.g., Fox, Sengupta, and Throbecke, 1973). Thus, an economic indicator such as the unemployment rate possesses external validity not only as the objective of economic policy but also through its past history of covariation with business cycles. Indeed, it would be rather irresponsible to make economic policy with respect to some indicator if nothing more were known about it than that it is the goal of a policy. Fortunately, we do not live in such a state of abysmal ignorance with respect to the standard economic indicators.

In the case of most of the generalized social indicators which have been proposed thus far, our knowledge is less well endowed, and Land (1974c) has observed that this is true for "quality of employment indicators." The latter indicators are usually conceived of as "outcomes" of employment which contribute to job satisfaction or utility (see Seashore, 1973 and Taylor, 1973 for lists of possible outcomes of employment).

In order to interpret the variations of a social indicator, Land (1971; 1974a; 1974b; 1974c) has emphasized the indispensability of a social indicator model, that is, a model which determines the value and variations of the social indicator in question as a function of policy instrument indicators and non-manipulable indicators (data). Moreover, this assistance in interpretation occurs at the conceptual level as well as in the quantitative sense. For example, some index of "schooling" is usually included among lists of social indicators. In order to interpret this index, one must specify fairly precisely the nature of the system and process under consideration, because, while schooling is an "output" of a school system, it is an "input" in terms of the characteristics

of an individual with respect to the job market. As a second example, we note that a health index such as "life expectancy" is only partially determined as an "output" of a narrowly defined health care system. In many cases, in fact, this index may be more strongly determined by such factors as genetics, nutrition, life style, etc. than by "delivery of health care." These examples illustrate how the careful definition of the system and process determining an indicator is essential to its interpretation.

The purpose of this paper is to describe two preliminary sociological models for an aggregate social indicator of job satisfaction. These models are preliminary in the sense that they are only first-order approximations to the limits of existing data and estimation methods. Both models link the job satisfaction indicator in a consistent historical pattern to referent indicators of social change. Thus, they lend external validity directly to this index as an indicator of social change and, hence, indirectly to any social indicator which covaries with job satisfaction. Moreover, this is of particular importance in the case of job satisfaction because of the role which satisfaction plays in the determination of social welfare and, hence, in planning, as noted above.

Land (1974b) has remarked that social indicator models typically take one of two forms. The first is a macro-sociological time-series model in which the purpose is to study the covariations of an "aggregate level of well-being" indicator with other aggregate indexes. The second type of model usually addresses equity values in terms of measures of dispersion of skewness and takes the form of a life-cycle and cohort analysis. In terms of these types, the first model to be described below is a macro model, in which aggregate job satisfaction is written as a function of aggregate unemployment, where the latter can be taken as a referent index of cycle social change. The second model complements the first by describing the effects of population structure and cohort replacement on job satisfaction.

2. A Macro Time-Series Model of Job Satisfaction

As a first approach to a macro-sociological time-series model for job satisfaction, consider an analysis of the data on trends in job satisfaction summarized in Table 1. These data from fifteen national sample surveys were reported in a recent Manpower Administration monograph by Quinn, Staines, and McCullough (1974) on the trend in job satisfaction, in which the authors (p. 1) conclude:

Table 1. Percentage of "Satisfied" Workers (Men Only, Ages 21 through 65)*, 1958-1973**

Date	Percentage Estimate (Sample Size)	Source
1958	81% (852)	Survey Research Center, U. of Michigan
1962	84% (1,028)	National Opinion Research Center
July 16, 1963	89% (1,469)	Gallup Poll
1964	90% (1,025)	Survey Research Center, U. of California
1964	92% (3,086)	National Opinion Research Center
August 6, 1965	87% (1,338)	Gallup Poll
September 6, 1966	92% (1,361)	Gallup Poll
September 29, 1966	89% (1,340)	Gallup Poll
March 25, 1969	92% (585)	Gallup Poll
November-December, 1969	88% (1,528)	Survey Research Center, U. of Michigan
1971	91% (1,025)	Survey Research Center, U. of Michigan
August 17, 1971	88% (516)	Gallup Poll
December 7, 1971	86% (558)	Gallup Poll
January 23, 1973	88% (526)	Gallup Poll
February-March, 1973	91% (1,493)	Survey Research Center, U. of Michigan

* Except for the 1958 survey which was based on men 21 or older

** "Don't know" answers were excluded from the percentage bases

Source: Quinn, Staines, and McCullough (1974)

"In spite of public speculation to the contrary, there is no conclusive evidence of a widespread, dramatic decline in job satisfaction. Reanalysis of 15 national surveys conducted since 1958 indicates that there has not been any significant decrease in overall levels of job satisfaction over the last decade."

Let us analyze the fluctuations in these data in more detail from a social indicator model perspective.

Before taking the analysis task seriously, however, we should determine to what extent the data are to be taken as an accurate representation of national trends in job satisfaction. Certainly, the series is affected by both methods variance and sampling variance. For example, over the years, the Gallup Poll Organization has asked the following question of a national sample of adults: "On the whole, would you say you are satisfied or dissatisfied with the work you do?" On the other hand, the other surveys tend to ask us a question of the form: "Are you very satisfied, somewhat satisfied, not too satisfied, or not at all satisfied with your job?" But, unlike the Gallup question, the wording of the latter has varied somewhat from survey to survey. Moreover, the Gallup polls do not restrict respondents to employed persons, whereas the other surveys are "surveys of working conditions" and hence are so restricted. But, for the sub-samples of men, ages 21 through 65, reported in Table 1, the civilian labor force participation rate is usually on the order of 90 percent or more (Quinn, Staines, and McCullough, 1974: p. 3). Also, each of the estimates in Table 1 is subject to sampling error. At the 95-percent confidence interval, the sampling error for percentages near 90 percent is about 2 percent for random sample sizes near 1500 and about 3 percent for random sample sizes near 500. Of course, since the surveys of Table 1 are not based on simple random samples, these sampling errors are best used only as approximate guidelines.

These error sources are substantial and cannot be ignored. Taken together, they make the data series in Table 1 less meaningful than we would like as a basis for building a social indicator model. Nevertheless, it is the only available national time-series on job satisfaction and, hence, the best. Therefore, proceeding on the assumption that some data is better than no data, we shall attempt an interpretation relative to other trends during the last decade and a half.

In our discussion of indicators of social change, we noted that one procedure for giving external social change validity to a social indicator is to determine its degree of covariation with referent time-series on social change. Moreover, the economy is a major source of cyclical social change. Since job satisfaction is a function of one's experience with a job, and since jobs are created in the economy, it follows that these strategies imply that we should explore the degree of

covariation of job satisfaction with an indicator of economic activity as a first approximation to a social indicator model of the macro variety. In particular, we note that, among the various stochastic components of the series in Table 1, there seems to be a significant covariation with the trend in unemployment rate for the 1958-1973 period. Table 2 shows that, from a peak of nearly 7 percent in 1958, the unemployment rate shows a general decline during the next several years, with significant peaks in 1961, 1963, and 1971.

Table 2. Total Unemployment Rates, 1958-1972

Year	Rate	Year	Rate
1958	6.8	1966	3.8
1959	5.5	1967	3.8
1960	5.5	1968	3.6
1961	6.7	1969	3.5
1962	5.5	1970	4.9
1963	5.7	1971	5.9
1964	5.2	1972	5.6
1965	4.5	1973	4.9

Source: Social Indicators: 1973, p. 136, and Manpower Report of the President, 1974, p. 23.

Regressing the data in Table 1 on those in Table 2 yields the following estimated equation:

$$(1) \quad S_t = 99.3 - 2.2 U_t + \varepsilon_t; \quad (R = -0.68) \\ (0.89)$$

where S_t = job satisfaction at time t , U_t = unemployment rate at time t , ε_t = a stochastic disturbance term at time t , the number in parentheses under the regression coefficient is its standard error, and the correlation coefficient is given at the right in parentheses. This equation is estimated for the nine time points for which the data can be matched in Tables 1 and 2. Therefore, it is only a first-order estimate and the correlation could probably be improved by dating the job satisfaction surveys by the month they were in the field and using monthly unemployment data. Nevertheless, the results in equation (1) are statistically significant and meaningful. Briefly, equation (1) implies that a 1-percent increase in the unemployment rate produces more than a 2-percent decrease in job satisfaction. It also implies that, if this linear relationship of unemployment and job satisfaction holds throughout the range of the job satisfaction variable, then job satisfaction could reach approximately 99 percent if the unemployment rate approximates zero. But the assumption on which this inference is based is probably not tenable; that is, equation (1) would probably exhibit some non-linearities at the upper end of the job

satisfaction scale. Moreover, the regression coefficient of U in (1) may be biased, for we have not adjusted for the possibility of autocorrelation of the disturbances in our estimation procedure. However, for this analysis, we shall be content with the least-squares estimates of equation (1).

For our present purposes, it is more interesting to tease out another implication of equation (1) for the job satisfaction data. Because the Gallup polls do not exclude unemployed men from the job satisfaction question, one implication of this model is that the Gallup series should show more sensitivity to the unemployment variable than the other series. That is, if unemployed men are more likely to be "dissatisfied" than are employed men, and if the unemployment rate increases by, say 1 or 2 percent, one anticipates at least 5 to 10 more "dissatisfied" responses in a sample of about 500 men. This is sufficient to register a 2- to 3-percent decrease in aggregate job satisfaction rates. Making the appropriate comparisons of the data in Tables 1 and 2, we do indeed find that the correlation of the Gallup series with the unemployment series is somewhat higher (-0.74 , $p < 0.05$) than that for the total series. On the other hand, equation (1) shows that even the inclusion of the job satisfaction rates based on the "working conditions surveys," which restrict respondents to employed persons, does not make the correlation vanish. It is tempting to conjecture why there should be any relationship between job satisfaction and unemployment rates for employed persons. One fairly direct hypothesis is that a rise in unemployment signals a decrease in opportunities for job promotion or for changing jobs and thus decreases job satisfaction. A more complicated theory would posit a relationship between "general satisfaction" and job satisfaction and argue that the former is decreased when the economy turns down and hence depresses the latter. Such conjectures cannot be subjected to evaluation by the present analysis.

3. A Life-Cycle-Cohort Model of Job Satisfaction

As a second example of a model constructed to make sense of the data in Table 1, consider a life-cycle model constructed on the basis of two consistently reported relationships in the job satisfaction literature. First, as Quinn, Staines, and McCullough (1974: p. 9) note, professional-technical workers and managers, officials, and proprietors register the highest levels of job satisfaction. In fact, Kahn (1972: pp. 181-184) observes that a strong positive correlation of occupational status and job satisfaction has been consistently reported in the literature. Explicitly, for occupational status scored in Duncan units (Blau and Duncan, 1967), the occupational status-job satisfaction correlation for the grouped data in Quinn, Staines, and McCullough (1974: p. 12) report a strong positive correlation between the age of a worker and his job satisfaction (approximately 0.95 for their grouped data) which has remained fairly consistent for the time-span for which data are available. We quote their interpretation of this relationship:

"The tenuous nature of generalizations about 'generation gaps' or related longitudinal trends seems all the more apparent when a far simpler explanation is considered--that older workers, especially in the case of men, are more satisfied with their jobs than younger workers simply because they have better jobs. In an achievement-oriented society, the 'best' jobs are reserved for those who can perform them best. Generally such performance depends on a worker's job experience, accrued skills, and demonstrated competence in related jobs. While this may not be true in all cases, certainly a job candidate's previous background and experience weigh heavily in the deliberations of those who will promote him or her to a 'better' job. Younger workers lack sufficient background to qualify them for the best jobs around. In addition, the fact that our society, like most others, places a high value on seniority increases the probability that better jobs will go to workers over 30. 'Beginners' in every sense of the word, younger workers are confined in consequence to positions that are often less than wholly satisfying."

In brief, the much talked-about decline in the job satisfaction of younger workers over the last decade has not been substantiated in the survey data. Rather, the positive age-job satisfaction relationship has been quite consistent over time. We shall use it and the occupational status-job satisfaction relationship to construct some life-cycle models to interpret trends in the data of Table 1.

Using first the positive age-job satisfaction relationship, we can construct a very simple life-cycle model for aggregate job satisfaction on the basis of the male age distribution data shown in Table 3. Assuming this relationship is constant and not cancelled out by other effects, we immediately conjecture that aggregate job satisfaction rates should be consistently higher in the 1960's than in the 1950's. Put simply, the cohorts of men in the low job satisfaction ages (21-29) in the 1960's were relatively much smaller than in the prior decade. Consequently, merely as an effect of the relative weights of the respective cohorts, we would anticipate that aggregate job satisfaction rates in the 1960's would be on a higher plateau than those of the 1950's. Indeed, the data in Table 1 do show that the job satisfaction rates for 1958 and 1962 are significantly lower than those for the remainder of the decade. Given the above observations about the effects of the unemployment rate and the fact that 1958 was a

year of high unemployment, it is likely that the 1958 percentage is depressed even lower than it would be otherwise. Nevertheless, it is clear that the job satisfaction rate does not again reach the low levels of 1958 and 1962 even though it dips several times in the succeeding observations.

Examining the age distribution for 1970, we would project, on the basis of this simple model, a stabilizing or declining aggregate job satisfaction rate for the 1970's as relatively large cohorts of male workers enter the low job satisfaction years of the life-cycle, thus weighting the aggregate average toward lower rates. Indeed, in Table 1, we find that the Michigan Survey Research Center rates are stable for 1971 and 1973, whereas the recent Gallup polls show a slight average decline from their 92-percent peaks of 1966 and 1969. But we can construct a more sophisticated model which allows for real social forces as opposed to the simple weighting effects of this model. The general nature of such a model is based on the following considerations.

Table 3. Male Population, by Age: 1960 and 1970

Age	Percent of Male Population	
	1960	1970
15 to 19 years	7.5	9.7
20 to 24 years	6.0	8.0
25 to 29 years	6.0	6.7
30 to 34 years	6.6	5.6
35 to 39 years	6.9	5.5
40 to 44 years	6.4	5.9
45 to 49 years	6.1	5.9
50 to 54 years	5.4	5.4
55 to 59 years	4.7	4.8
60 to 64 years	3.9	4.1

Source: Social Indicators: 1973, p. 255

Relative to the positive occupational prestige-job satisfaction relationship, we note first that recent research (Hauser and Featherman, 1973) has found that there was more upward mobility during 1962-1970 than during 1952-1962. In addition, on the basis of White's (1970) research, it is now clear that one of the principal ways in which upward mobility occurs is through the creation of "vacant" positions at the top of the job structure. Such a vacancy reverberates throughout the occupational structure by creating a "chain of vacancies" as men are successively pulled up through the structure. On a society-wide scale, there are essentially two ways in which vacancies at the top of the occupational prestige scale can

be created. One is through the expansion of those sectors of the economy in which higher prestige occupations are dominant, and the other is through the replacement of older cohorts as they retire or otherwise exit from the occupational structure. Both of these forces were very strong during the 1960's. That is, the 1960's were years of great expansion of the professional-technical, managerial-proprietor, and sales-occupational categories (Hauser and Featherman, 1973) and a decade in which replacement vacancies for men aged 21-29 in 1960 were high because of the larger cohorts ahead of this cohort, as can be seen in the age distribution for 1960 shown in Table 3.

Now, if the cohort of men in the low job satisfaction years (ages 21 to 29) in the early 1960's did experience higher rates of mobility into upper status occupations during the 1960's due to higher rates of job expansion in these occupations and higher vacancy replacement rates due to the smaller size of their cohorts, and if the occupational status-job satisfaction relationship is relatively constant, then, other things equal, we would expect the cohort of men aged 21 to 29 in the early 1960's to show a large increase in job satisfaction over this decade than the age 30 to 39 and 40 to 49 cohorts. Some data for making a rough check on this hypothesis are shown in Table 4. These data correspond to four of the fifteen surveys reported in Table 1 which give age tabulations with equal age intervals. We find that the 21-29 category in 1962 shows an increase of 16-18 percent in job satisfaction by the 1971 and 1973 surveys, whereas the 30-39 and 40-49 categories of 1962 show an increase of only 11-12 percent over this interval. Thus, the increase of the satisfaction percentage in the younger cohort is approximately one-half greater than that of the older cohorts. But to verify that this change is not due only to the life-cycle positive aging-job satisfaction relationship reported above, we should also find that there is an increase in job satisfaction for the same age intervals between 1962 and 1973. Examining Table 4, we find that they are about 10 percent on the average for the different age intervals. Thus, the observed 16-18 percent increase in job satisfaction of the 1962 21-29 cohort cannot be fully accounted for by either the life-cycle or the period effects alone. We conclude that the observed increase in satisfaction for this cohort is due both to the effect of the positive aging-job satisfaction relationship and to the effect of the period changes of the 1960's. It is worth noting that these conclusions are somewhat different from those of Quinn, Staines, and McCullough (1974: p. 7) who adduce that jobs have improved in terms of: (1) real wages and fringe benefits; (2) Federal and State legislation on working conditions; (3) computerization of menial jobs; and (4) a more "employee-centered" management. Of these four factors, our model does not explicitly incorporate the second and fourth. Although these job improvements may have had an impact in the movement of job satisfaction rates to the relatively higher plateaus of the 1960's, their effects are very difficult to document and the foregoing analysis shows that they may not be necessary to account for the observed changes. Moreover, they do not lead to any predictions for the 1970's as does the model sketched above.

Table 4. Percentage of "Satisfied" Workers, 1962-1973, by Age for Four Surveys with Equal Age Intervals

Age Intervals	Year and Source			
	1962	1969	1971	1973
	NORC	SRC, U of M	SRC, U of M	SRC, U of M
21 to 29 years	74	75	85	84
30 to 39 years	82	76	90	92
40 to 49 years	84	88	93	94
50 years and older	88	87	95	96

Source: Quinn, Staines, and McCullough (1974: p. 54)

Examining the age distribution for 1970 in Table 3 relative to this more complex life-cycle model, we again project a stabilizing or declining aggregate job satisfaction rate for the 1970's. In brief, the cohorts of young men coming onto the job market in the 1970's are no longer smaller than the ones preceding them. Thus, the upward mobility of these men will not be assisted by this replacement aspect of the vacancy chain effect to such an extent as were their peers in the 1960's. Moreover, even if the economy expands at its traditional 3 to 4 percent per year rate throughout the 1970's, it will be hard pressed to give upward mobility rates to the oncoming cohorts of young men comparable to those which were experienced by their peers in the previous decade. The lower rates of upward mobility will thus give these men lower job satisfaction rates, which, together with their larger relative cohort sizes, will produce a lower aggregate job satisfaction rate. More precisely, we expect the aggregate rate to be stable at first and then to decline in the middle and later 1970's.

To summarize this brief excursion into the analysis of job satisfaction, we have presented rough arguments for two types of social indicator models for the data of Table 1. First, our macro time-series model argues that the aggregate job satisfaction rate does go down when the unemployment rate goes up, particularly if unemployed persons are allowed to answer a job satisfaction question. Second, our life-cycle model argues that the "high plateau" of job satisfaction percentages of the 1960's was due to the interaction of the normal life-cycle relationship of age to job satisfaction with the unique size and mobility experience of the low satisfaction-prone cohorts of this period.

In terms of our macro model as expressed in equation (1), this implies that the constant term shifted upwards in the mid-1960's from a lower value for the earlier period. Unfortunately, this implication cannot be tested directly, due to a paucity of time points on job satisfaction prior to 1962. These models are only very tenuously formulated and are meant to be illustrative rather

than definitive. Nevertheless, they do permit a rough forecast of expected job satisfaction rates for the 1970's, something which no other analysis has yet allowed. That is, our first model forecasts a fluctuation of this rate with the unemployment rate, whereas our second model forecasts a tapering off of the rate of job satisfaction improvement and a slow movement to a plateau (constant term) of aggregate rates which will probably be lower than that of the 1960's. Of course, these forecasts assume that the effects in the models remain constant and are not cancelled out by other changes which have not been taken into consideration.

4. Conclusion

Just as the great social issues for the late 1960's centered around problems associated with teenagers such as drugs and crime, one can project that the 1970's will see considerable attention given to issues associated with quality of employment and job satisfaction. In both cases, the fundamental driving force is the age structure of the population. On the basis of our distinction between macro time-series and life-cycle social indicator models, we were led to explore the effects of the population age composition and of the economy on a time series of aggregate job satisfaction rates. By demonstrating that job satisfaction has a consistent relationship with these referent indicators of social change, we have given it (and, indirectly, any quality of employment indicator that is correlated with job satisfaction) some degree of validation as an indicator of social change in the sense described in Sections 3 and 4, and this holds regardless of whether job satisfaction is treated as a goal output indicator in a social policy.

Relative to social policy with respect to job satisfaction, it is worth noting that our models indicate that aggregate job satisfaction could be maximized in a number of ways: e.g., (1) by decreasing the unemployment rate to near zero; (2) by not allowing anyone under age 29 to be employed; and (3) by abolishing blue-collar jobs. None of these alternatives is practicable in an extreme

sense, although it is national economic policy to keep the unemployment rate as low as feasible and the shift in the labor force has been away from operative and nonfarm labor jobs for some time.

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