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Methodological Analysis and Test of System 4  
Theory in Brazil

D. Anthony Butterfield and George F. Farris

Working Paper No. 608-72

July, 1972

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Abstract

A 20-item Likert Organizational Profile (LOP) was administered twice to 256 employees in 13 Brazilian development banks. Actual and ideal bank profiles were similar to those found in the U.S. and elsewhere: employees want participative-group management methods but say their organization uses autocratic or consultative methods. Factor analyses did not yield the six dimensions predicted by Likert's theory; factors were only partially consistent over time and for different hierarchical levels. Retrospective scores were quite accurate and equally so for 6, 12, and 18 month time periods since original administration. Test-retest reliability of the LOP as a whole was moderate. Bank LOP scores were unrelated to objective measures of organizational effectiveness, but were positively related to employee satisfaction. The LOP appears useful for current and retrospective organization studies, but the theory of management systems measured by it was only partially supported.





The Likert Organizational Profile:

Methodological Analysis and Test of System 4 Theory in Brazil<sup>1</sup>

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The work of Rensis Likert and his associates at the Institute for Social Research represents a major contribution to modern organization theory. Likert's two books (Likert, 1961, 1967) summarize much of the work of the Institute and present his own theory of management. The theory postulates four systems of management, and argues that system 4, "participative-group", is the most effective. A considerable amount of empirical research is presented in support of the theory. Most of the research was done in organizations in the United States.

More recently, the theory has been tested in Yugoslavia and Japan, using various versions of a "profile of organizational characteristics" (Likert, 1969; Kavčič, Rus, & Tannenbaum, 1971). The profile is a questionnaire which describes an organization on the dimensions of Likert's theory, and has come to be known as the "Likert Organizational Profile", or LOP. The LOP has also been used in the United States, frequently in studies of change (e.g., Marrow, Bowers, & Seashore, 1967; Golembiewski & Carrigan, 1970a and b; Blumberg & Wiener, 1971).

Despite this use of the LOP in organization studies, it has not been subject to much analysis as a measuring instrument. Little evidence has



been presented as to the LOP's reliability or factor structure. The purpose of the present paper is to present a methodological analysis of the LOP, and to examine the suitability of using the LOP to study organizations in a country outside the United States -- Brazil in the present case. We shall also test support for Likert's theory in Brazil.

To meet these objectives we shall a) present profiles of Brazilian organizations as seen by their members in terms of Likert's four management systems; b) discuss factor analyses of the LOP; c) present a longitudinal analysis of the profile; d) examine relationships between LOP scores and organizational effectiveness and employee satisfaction.

### Method

#### Instrument

The LOP used in the present study was Form S, distributed by the Foundation for Research on Human Behavior (1967). Two items (nos. 2 - subordinates confidence in superiors - and 12 - subordinates knowledge of organizational policies) were added at the request of the Brazilians, making a total of 20 items on the profile. Questions were translated from English into Portuguese by bilingual Brazilians. These translations were then checked and revised by the authors in collaboration with the translators until all were satisfied that the translations were as accurate as possible. An independent re-translation into English indicated that the Portuguese and English versions were essentially identical.

LOP questions are answered on a 20-point scale divided into four sections, each section representing one of the four management systems described by Likert's theory. Each question has a different set of four descriptive alternatives, corresponding to the characteristics of the four management systems. For example, question 1 asks, "How much confidence is



shown in subordinates by superiors?" The four alternatives spread out on the 20-point scale are, "Very little, Some, Substantial, Very much." Responses more toward the right on the scale receive a higher numerical value and indicate use of a management system more like the participative-group system 4 seen by the theory as most effective. According to Likert (1967), the fact that all the scales are in the same direction does not influence the results.

The items in Form S are grouped into six theoretical dimensions of organizational processes. Items 1 - 4 measure leadership; 5 - 7, motivation; 8 - 12, communication; 13 - 15, decision making; 16 - 17, goal setting; and 18 - 20, control. Both individual item scores (Golembiewski & Carrigan, 1970a and b; Kavčič, Rus & Tannenbaum, 1971) and index scores (Blumberg & Wiener, 1971; Marrow, Bowers, & Seashore, 1967) on the basic dimensions have been used in previous research.

### Procedure

The LOP was administered in group sessions during visits to Brazilian development finance institutions. On the first administration, instructions were to answer each question twice, once to describe the organization as it was actually, and a second time as it should be ideally. On the second administration, six to eighteen months later, instructions were to describe the organization as it was actually, and as it had been previously (at the time of the first administration, although the first administration was not referred to specifically).

Complete data are available from 13 organizations. One was privately owned, the others were either development banks or development finance



companies, owned by state or regional governments. For two banks there was a six-month time lag between administrations; for eight banks there was a 12 month time lag; and three banks received the LOP 18 months after the original administration. These differences in time were designed to look at accuracy of retrospection as a function of the passage of time. It was the authors' impression that the participants in this study were quite interested in the task of completing the questionnaire; questionnaire administration sessions seemed to go as well as they do in the United States with similar respondents.

### Respondents

Respondents were professional employees ranging from non-supervisors to bank presidents. Sixty-seven per cent were between the ages of 25 and 34; 76% had more than 15 years of schooling; 53% had been with their organizations four years or less; 80% were either lawyers, economists, engineers, or accountants.

Total individual N's for the Time 1 and Time 2 administrations were 211 and 256, respectively. They represent a non-random sample of about 85% of the professional staff involved with a loan program for small and medium sized industrial firms. N's within banks varied from 7 to 41, the size of the sample generally reflecting the size of the bank. Size did not influence the results.

### Analysis

Except for the factor analyses and hierarchical analyses, data were analyzed using bank mean scores. The bank was selected as the unit of analysis since the LOP is designed to measure organizational characteristics, and our primary concern is with the management systems of organizations.





## Results

### Profiles

What management system are these Brazilian development banks actually using, and what system would they like to be using ideally? Figure 1

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 Insert Figure 1 about here  
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presents the average actual and ideal profiles from the 13 banks, based on the first LOP administration. It is evident that these 13 financial institutions were actually using a system 3 "consultative" style of management, with system 2 attributes in the area of decision making and goal setting. The ideal style was seen as system 4. Analyses of variance indicated essentially no differences among banks on their ideal profiles, and significant differences on their actual profiles. Similarly, analysis of variance among three hierarchical levels in the banks (non-supervisory professionals, supervisors, and top management) showed no difference on ideal profiles, but frequent differences on the actual profiles. Higher organizational levels tended to see their organization as more toward system 4 than did lower levels. Thus there was substantial agreement among banks and organizational levels that system 4, "participative-group", would be the ideal management style, yet the actual system was seen as being more towards consultative or autocratic.

The profiles in Figure 1 are similar to those found in Likert's studies. They suggest that, in terms of Likert's theory, Brazilian development banks may be using management systems not very different from those used by organizations in the United States, or even Yugoslavia or Japan.



Factor Analysis of the LOP

The short form of the LOP was designed to measure six basic organizational processes: leadership, motivation, communication, decision making, goal setting, and control. Does it? Factor analyses of the LOP were carried out to examine its basic structure and to see if there was empirical support for the proposed six dimensions.

Table 1 presents results of the factor analysis of the ideal responses from individual respondents at all organizational levels. A principal

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Insert Table 1 about here  
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components analysis was used, with varimax rotation for six factors. Except for the first factor, which is clearly leadership, the factors are at best mixtures of the dimensions proposed by the theory. We have given them the tentative labels of "resistance, guidance, informed decision making, dispersion of goal setting and control," and "motivation and communication." In additional analyses it was more difficult to label factors. Note that analysis should have stopped with five factors, since the Eigenvalue for the sixth factor is less than 1.00. A careful examination of Table 1 also indicates that neither item 5 (type of motivation used) nor item 7 (amount of teamwork) find a place in any of the six factors.

Additional factor analyses were carried out for the actual responses from the two time periods. However, since results were much less interpretable, they will not be presented here. Controls for organizational level tended to complicate rather than clarify results. The most consistent factors were leadership and resistance, but they emerged in a different order and with a different make-up in each analysis. Usually there were only three or four factors with Eigenvalues greater than 1.00.



Items 7 and 5 frequently did not appear.

The results in Table 1 represent in a sense the best of what the factor analyses produced; that is, somewhat interpretable factors with at least some relationship to the theory. Repeated analyses produced only fair factor consistency over time, fair overlap between ideal and actual factors, and fair to poor comparability across organizational levels. This lack of consistency in factors across different analyses was the characteristic outcome, not the emergence of a large and possibly Halo-induced general factor. Other studies (Likert, 1967; Marrow, Bowers & Seashore, 1967) have alluded to such a Halo factor, but none was found in the present case. Since factors were not clear cut and consistent across the different analyses, the creation of factor scores did not seem justified. Subsequent analyses were based on individual items as well as a total LOP score (overall average across the 20 items). The latter seemed justified in view of high intercorrelations among the twenty LOP items and Likert's (1967) assertion that the LOP measures relatively consistent management systems.

#### Longitudinal Analysis of the LOP<sup>4</sup>

How reliable are LOP scores over time? In particular, how accurate are LOP scores when used retrospectively? The accuracy issue should be of general interest since investigators frequently ask respondents on questionnaires to remember how things were at some point in the past, without knowing in fact how they really had been. In the present study we knew.

Accuracy of retrospection. We might expect that accuracy of retrospection decreases as time increases due to forgetting. Thus in the present study the banks in which the Time 2 administration followed the Time 1 adminis-



tration by six months should be the most accurate; retrospective scores from the 18-month time lag banks should be the least accurate, and the 12 month group of banks should fall in between. However, if retrospection were perfect, the actual and retrospective profiles within each time grouping should be the same. Preliminary visual inspection showed remarkable overlap between the actual (first administration) and retrospective (second administration) profiles within each of the 3 time groups. T tests done on an item by item basis, separately for each time group, confirmed that there were few significant differences between actual and retrospective item scores, for any time group. These results are summarized, using mean total LOP scores, in Table 2. An F test on the average difference score

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 Insert Table 2 about here  
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for the three groupings confirmed that there was no difference in accuracy among the three retrospective periods ( $F = 0.268$ ).

Test-retest reliability. To look at "real change" as a function of time, similar longitudinal analyses were carried out comparing Time 1 actual LOP scores with Time 2 actual scores. Results (not shown) were the same as for retrospective scores: time had no effect. Since time differences produced no differences in either retrospective accuracy or change, simple rank order correlations were calculated using all 13 bank means on total LOP. Time 1 actual scores correlated rho .63 with Time 2 retrospective scores, and rho .52 with Time 2 actual scores. With an N of 13, both correlations are significant beyond the .05 probability level using a one-tail test. The first rho (.63) might be considered the retrospective reliability of the LOP. The second (.52) is the test-retest





one another.

The last four measures in Table 3 are items taken from another questionnaire administered in the banks at the time of the second LOP administration. They are the employees' own perceptions of how effective their bank is, how satisfied they are with their own supervisor, the extent to which the bank's employees are satisfied rather than dissatisfied, and their evaluation of their bank as a place to work compared with other organizations they know. Since organizational level had a significant effect on these items (higher levels reporting more favorable responses), the results in Table 3 are based on LOP and questionnaire data from non-supervisory professionals only.

Table 3 shows that bank scores on the LOP were not related to objective measures of bank effectiveness, but they were related in the predicted manner to three of the four questionnaire measures of effectiveness and satisfaction. Contrary to theory, system 4 methods of management were not associated with better organizational performance, but they were associated with employees' feelings about performance and with employee satisfaction. The theory is thus only partially supported.

Note the nature of the one satisfaction item in Table 3 not related to LOP. Apparently, employees who described their organization as more towards system 4 were not more satisfied with their own supervisor (nor were they more dissatisfied). One's immediate supervisor may not be more satisfying in a system 4 organization, yet employees do feel that the entire organization is more effective, is a better place to work, and has more satisfied employees. It appears that the LOP can distinguish between more general organization-wide and more immediate work-group characteristics.



### Discussion

Development banks are probably among the more modern of Brazilian organizations. They are relatively new, and hire a high percentage of young and well educated employees. Under these conditions, the LOP appears to be a useful instrument for organization studies in Brazil. Questionnaire administration went quite smoothly, and profiles were remarkably similar to those obtained in the United States. Common stereotypes of Latin American culture would predict that in more traditional Brazilian organizations we might encounter more difficulties in administration of the LOP, and we might find both actual and ideal profiles toward the authoritative end of the scale. These stereotypes merit empirical test.

The factor structure of the LOP does not correspond well to the six hypothesized organizational processes. This is not a serious drawback, but it does suggest that index scores on the sub-scales should be used with great caution. Likert himself recognizes the difficulty in obtaining factors corresponding exactly to the proposed dimensions (Likert, 1967). He argues that either ideal scores or actual scores from within a single organization will yield cleaner factors. In the present study we did not have sufficient data to justify factor analysis from within a single organization. Factor scores aside, much can still be done with individual items and especially with a total LOP score. Using ideal and actual profiles in a feedback program for organizational development has been useful in both Brazil (Butterfield, 1970) and the United States (Blumberg & Wiener, 1971).

The reliability of the LOP over an extended period of time is a complex question. On the one hand, it seems quite clear that organizational members



do a fairly accurate job in remembering the state of their organization 6, 12, or 18 months into the past. Furthermore, these differences in time have no effect on the accuracy of retrospection. Using the LOP retrospectively thus appears to be quite legitimate, at least up to a period of 18 months. On the other hand, total scores on the LOP are only moderately stable over time. The test-retest reliability (.52) obtained in the present study, though statistically significant, is certainly not high by traditional testing standards. However, given the small number of organizations (13) and the rather dynamic state of the development finance field in Brazil, perhaps we ought not to have expected the test-retest reliability to have been much higher.

Results of the correlations between LOP and dependent variables are of particular theoretical interest. As predicted, Brazilian development bankers were more satisfied with participative-group management systems (although such satisfaction was not dependent on satisfaction with the immediate supervisor), and said such systems would be the ideal. Contrary to theory, organizations tending to use such systems were not more effective in terms of objective performance.

System 4 theory would explain these different results by invoking a time-lag argument. The benefits of using system 4 methods are already apparent in the greater satisfaction of organization members. Such satisfaction usually precedes changes in organizational end-product variables. Improved performance is on the way; it is only a matter of time. Unfortunately, although we do have longitudinal data in the present study, we do not have sufficient data over a sufficient time period to test adequately the time-lag hypothesis.



An alternative explanation is the "manpower competence-performance feedback loop hypothesis" (Farris, 1969; Farris & Butterfield, 1971). The effectiveness of participative methods depends on having competent, experienced employees. When such a manpower base does not exist, as is the likely case in developing countries, participative methods are not likely to be more effective. Greater relative competence resides at the supervisory level, so that closer methods of supervision may be more appropriate, as well as more accepted (Farris & Butterfield, 1971). In the present study, for example, satisfaction with immediate supervisor was not significantly related to being in a more participative organization.

These are alternative rather than competing hypotheses. Results of the present study suggest that the LOP may be a useful instrument for exploring them further, even if system 4 theory is only partially supported in Brazil.





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Footnotes

- 1 This study was supported by a grant from the Ford Foundation. The authors wish to thank members of the Grupo de Trabalho Misto for their help, and Dr. Rensis Likert for his permission to use the LOP. Special acknowledgement goes to Cecilio Berndsen and Eldon Senner for their assistance in gathering and processing the data.
- 2 Now at the School of Business Administration, University of Massachusetts, Amherst, Massachusetts.
- 3 Requests for reprints should be sent to George F. Farris, Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139.
- 4 All longitudinal analyses were carried out separately for each organizational level. Results were essentially identical. Data presented in the longitudinal section are from respondents at all organizational levels combined.
- 5 This ratio includes development loans of all types, not just small and medium industrial projects. The rank ordering of banks on financial data was so highly correlated from year to year in prior years that data on this ratio were not obtained for 1970.



TABLE 1

## Factor Analysis of Ideal Likert Organizational Profile

<u>Factor</u>	<u>Item</u>	<u>Loading</u>
1. "Leadership" Eigenvalue 5.689 Cumulative prop. of total variance	1) Confidence in subordinates	.799
	2) Confidence in superiors	.754
	3) Subs feel free to talk to sups	.714
	4) Subs ideas sought, used	.627
2. "Resistance" Eigenvalue 1.850 Cumulative prop. of total variance .377	17) Covert resistance org. goals	.820
	19) Informal org. resists formal	.760
3. "Guidance" Eigenvalue prop. of total variance .452	20) Use of internal control data	.737
	9) Acceptance communication down	.706
4. "Informed Decision Making" Eigenvalue 1.225 Cumulative prop. of total variance .513	14) Subs involved decisions related to work	.674
	11) Sups know subs' problems	.662
	13) Where decisions made	.628
	15) *D-M contribute motivation	.577
	12) *Subs know org'l policies	.500
5. "Dispersion of Goal Setting and Control" Eigenvalue 1.036 Cumulative prop. of total variance .565	18) Distribution of internal control	.663
	16) How org'l goals set	.620
6. "Motivation and Communication" Eigenvalue .978 Cumulative prop. of total variance .613	8) Direction of information flow	.760
	6) Where responsibility felt	.690
	10) Accuracy of communication up	.610

\* Item loads on more than one factor over .40





TABLE 2

Summary: Effect of Time on Retrospection

<u>Time Group</u>	Mean Total LOP		<u>T</u>	<u>df</u>	<u>P</u>
	<u>Time 1 Actual</u>	<u>Retro-spective</u>			
6 months	9.91	10.48	.82	1	NS
12 months	11.54	11.46	-.23	7	NS
18 months	12.32	12.49	.18	3	NS



TABLE 3  
Correlations Between Bank Total LOP Scores  
and Effectiveness, Satisfaction

<u>Effectiveness</u>	<u>LOP</u>
1. Number of development loans, 1970	-.01
2. Ratio of development loans to total assets, 1969	.07
3. Rankings of overall effectiveness by National Bank experts, 1970	.28
4. Bank self-rating of effectiveness	.78**
 <u>Satisfaction</u>	
5. Satisfaction with immediate supervisor	.24
6. Employee satisfaction with bank	.77**
7. Evaluation of bank as place to work	.83**

\*\*  $p < .01$ , one-tail

Note. - Rank-order correlations using Time 2 actual LOP scores and questionnaire data from non-supervisory professionals only. N's range from 11 - 15, including 2 banks not part of longitudinal analysis.



Figure Caption

Figure 1. Bank Mean Ideal and Actual LOP Profiles, Time 1

(N = 13 banks)



System

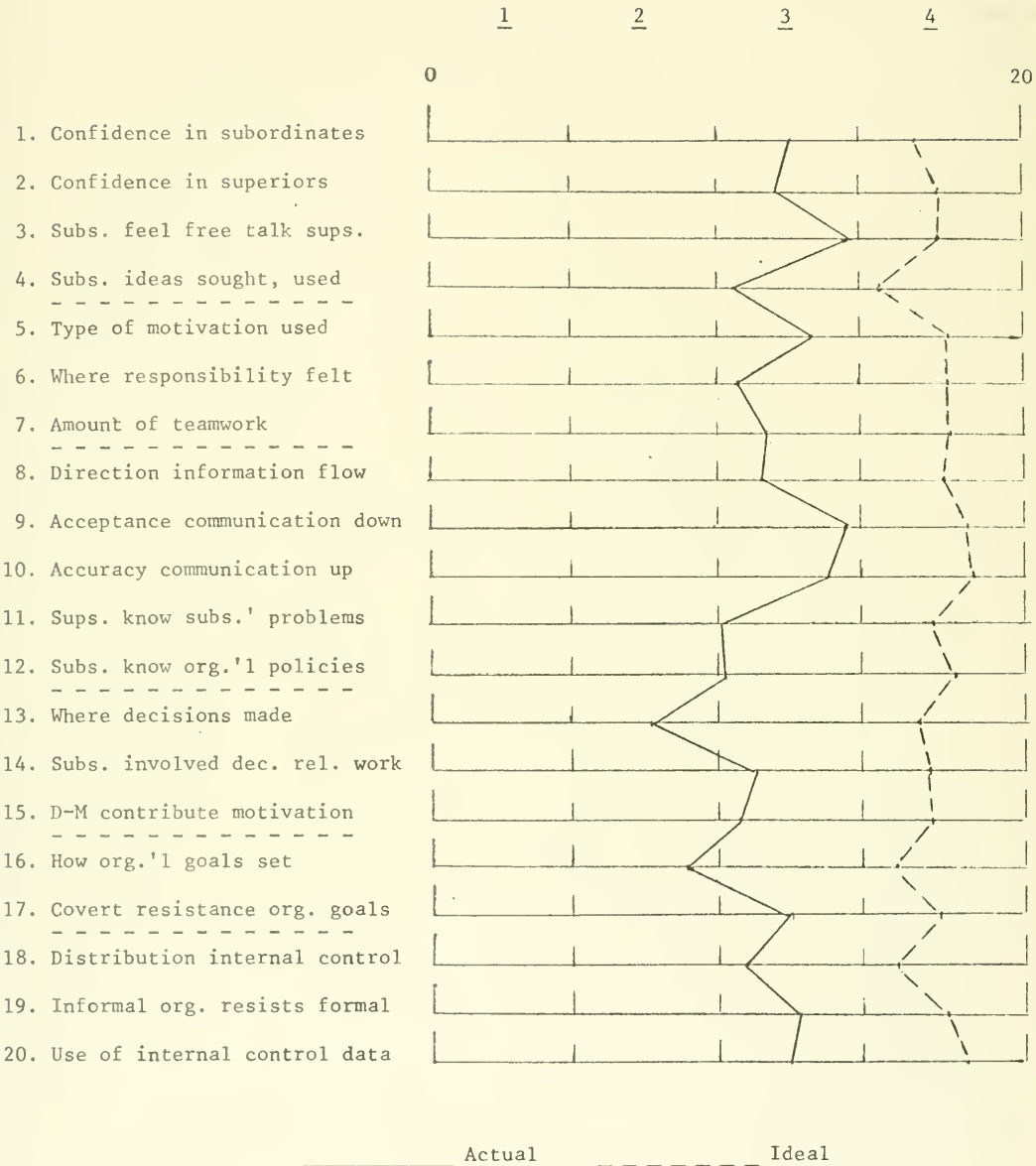


Fig. 1. Bank Mean Ideal and Actual LOP Profiles, Time 1  
(N = 13 banks)

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