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ABSTRACT

First-level supervisors from a cross section of business and industrial organizations provided evaluative and descriptive information about the immediate work group which each supervised. From this information, a model was built depicting first-level supervisory perceptions of behaviors which lead to work unit effectiveness. This model was compared with a model based upon higher level managers' perceptions of what leads to first-level unit effectiveness. There was an overwhelming importance of production emphasis by both groups, but supervisors were more concerned with immediate or short-run variations in performance, while managers were concerned with total or long-run performance. Supervisors' criteria of organizational effectiveness appear generally reflective of managerial perceptions and goals, and the four dimensions of the managerial model can be found in the supervisory model. Managers tend to view human relations dimensions as important in themselves, while supervisors view these dimensions as important only as a means to the economic performance dimensions. (Author/MT)





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William Weitzel, Thomas Mahoney, and Norman Crandall

Technical Report No. 9000

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First level supervisor's (N = 53) from a cross-section of business and industrial organizations in metropolitan Minneapolis - St. Paul provided evaluative and descriptive information about the immediate work group which each supervised. From this information a model was built depicting first level supervisory perceptions of behaviors which lead to work unit effectiveness. This model was compared with a model based upon higher level managers perceptions of what leads to first level unit effectiveness. The overwhelming importance of production emphasis by both groups and the use of human relations behaviors in an instrumental fashion by first level supervisors is discussed in connection with managerial philosophy. Other similarities and differences between the models from the two organizational levels are considered.

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Work group	F.O.L.E	wT	ROLE	w T	ROLE	WT
Supervisory model of effectiveness Organizational characteristics Supervisory perceptions of unit effectiveness Short run production goals Support Reliability Planning Productivity Effectiveness First level supervision Human relations Man in the middle Models of organization effectiveness Organization effectiveness Performance variation Supervision Supervision Supervisory training		·	 			

A SUPERVISORY

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The role of the first-line supervisor has been analysed a number of times. Despite these studies, the first-line supervisor still is one of the least understood jobs in an organization. He has been called the "forgotten man" and the "man in the middle". Many managements view first-line supervision as the most critical job in the management framework. Certainly this job contains the largest number of positions of any jeb in the managerial hierarchy. Considerable money is spent each year to train supervisors, trying to incorporate them into the "management team". Yet the supervisor remains the "man in the middle", the position which is neither fully managerial nor that of a worker.

The supervisor's task as the "man in the middle" is to serve both superiors and subordinates. As the last in the managerial chain, he must translate managerial demands and expectations into terms and tasks understandable to employees. At the same time, he tends to be the link between management and the technology of the workplace and the work force. He is the only element of the managerial force with "hands on" contact and knowledge of both the technology and the work force. He



is expected to use this contact to obtain the results desired by management. As the last in the managerial chain, he is less a formulator of management goals and more often a transmitter and implementer of these goals to the work force.

The first-line supervisor also is expected by both superiors and subordinates to inform superior levels of management about the goals, desires and problems of the work force and about the constraints the technology places upon achieving these goals and desires. In a sense, the supervisor is the only element of the workplace with "hands on" contact with management. Both superiors and subordinates try to use the supervisor in their negotiations with the other party, both strive to capture his loyalty by making him dependent upon them. The first-line supervisor is in fact the "man in the middle".

Many organizations provide supervisory training to assist the supervisor in his difficult role. The content of this training typically is dictated by superior managers or by educators, not by the supervisor. Supervisory training programs have changed in emphasis over the past thirty years to include increasing attention to human relations—the motivation of people, their needs and desires, modes of interpersonal relationships, systems of social interaction, and the status of various individual roles in groups. These changes in content might be justified on any of several grounds: 1) understanding of human relations will aid the supervisor in obtaining commitment of subordinates to managerial goals and thus facilitate the achievement of these goals, 2) understanding of human relations will assist the supervisor in building a strong work force capable of increased participation in the organization, or



3) understanding of human relations will assist the supervisor in understanding and interacting with both superiors and subordinates. One suspects from the supervisory training literature that human relations training for supervisors is sought for the first purpose, justified in terms of the second purpose, and accomplishes most along the third dimension above. A classic study of supervisory training pointed up the third contribution of human relations training in aiding the supervisor to better understand the demands placed upon him by his superiors.

Studies of the supervisor and his job have tended to focus upon him as an individual and upon the personal performance demands made of him. A recently conducted examination of the first-line supervisor and his job was undertaken in a somewhat different vein. The supervisor was looked at as the head of a work group, and his perception of his job was analysed in terms of his understanding of organizational or work group effectiveness. As head of the work group, the supervisor's mission is to achieve and maintain the effectiveness of that organizational unit. His perceptions of the prerequisites or criteria of organizational effectiveness portray his understanding of his job. Analysis of the supervisory model of organizational effectiveness and the comparison of this model with the models perceived by others in the managerial hierarchy provide a number of insights into the role of the supervisor and the relevance of supervisory training in human relations.

What Organizational Effectiveness Means to Supervisors

An examination was made of supervisory perceptions of organizational effectiveness based upon information provided by 53 supervisors enrolled in a course on human relations in supervision. These super-



visors were employed in a cross-section of firms in the Minneapolis-St.

Paul area. The employing firm in each case approved, if not endorsed, enrollment in the course.

The supervisors provided a variety of information, descriptive and evaluative, about their immediate work groups, the organization units which they supervised. This information was summarized in a series of measures of 19 dimensions of organizational characteristics, behaviors, and performance. These dimensions are listed in Figure 1. Additionally, the supervisors provided assessments of overall effectiveness of the work units. A method of analysis* developed for earlier studies of managerial perceptions of organizational effectiveness was employed to identify the relationships perceived by supervisors between the organizational dimensions and effectiveness. A model depicting these relationships is presented in Diagram 1.

The first-line supervisor equates production performance -- quantity, quality, and efficiency of production -- with organizational effectiveness. A weight of about 80 per cent was assigned to production criteria in making judgments of overall effectiveness.

Other dimensions of organizational behavior were perceived to be supportive of productive performance, although otherwise inconsequential for organizational effectiveness. Mutually supportive relationships between the supervisor and his subordinates and the planning of performance within the unit such that disruptions of operations rarely occurred



^{*} A multiple regression model was constructed using a step-wise regression procedure. The supervisors' descriptions were regressed on their evaluations of the effectiveness of their units. This model and the intercorrelation matrix provide the basis for the supervisory model.

were perceived important in achieving production criteria. Additionally, reliability of performance, the ability to deliver without need for follow-up and checking, appeared to assist in achieving the production criteria. The support and planning dimensions were in turn perceived to be related to cohesive attitudes within the work force, the coordination of schedules and activities with related work units, and the absence of conflict with other work units.

A third group of organizational dimensions were peripherally related to overall effectiveness. These include adequate communication within the work unit, development of the abilities of the workers in the unit, initiation of new ideas and programs, and flexibility of the unit in adapting to changed conditions and demands. These dimensions or characteristics appear to correlate with the cluster of dimensions above.

One might infer a description of the supervisor's perception of his job from this model. The supervisor could be expected to direct his efforts toward the achievement of effectiveness of his work group, and thus to take the actions indicated in this model. The first-line supervisor could be expected to devote most of his attention to achieving immediate production goals. He will plan his operations to avoid disruption and to meet deadlines and he will strive to maintain supportive relationships with his subordinates as a means of achieving the necessary production goals. Additionally, he will work to coordinate activities with related units, to avoid conflict with these units, and to maintain cohesive relationships within the work force also as a means to achieving the production goals. Efforts to improve communications, to develop subordinate abilities, to initiate programs within the unit



will be subordinated to the goal of production. Supervisory control of work progress probably is the result of planning and undoubtedly helps to prevent conflicts from occurring. Absence of conflict seems to act as the linking pin connecting this second cluster and the dimensions of communication, development, initiation, and flexibility.

It is interesting that many of the organizational dimensions related to concepts from the human relations tradition do not appear in this supervisory model of organizational effectiveness or appear only peripherally, despite the fact that the supervisors were completing a course in human relations. Dimensions concerning delegation, democratic supervision, or decentralization are not perceived by the supervisor to be relevant to organization effectiveness. Other dimensions such as development, communication, cohesion, and support are perceived as instrumental to the achievement of production and irrelevant as ends in themselves.

One might surmise that the supervisory perceptions of organizational effectiveness reflect the demands of their superiors, not the preachments of instructors in the course. Fortunately, it is possible to check the validity of this reasoning through a comparison of the supervisory model of organizational effectiveness with a comparable model obtained from managers in earlier studies.

What Organizational Effectiveness Means to Managers

Earlier studies² of perceptions of organizational effectiveness of managers have used the same basic approach as that employed with the supervisors. One difference in the approach used is relevant here. Whereas the supervisor's attention was focused upon effectiveness of his own work unit, the manager's attention was directed toward effectiveness.



ness of work units subordinate to them, work units whose supervisors reported to the managers. Thus the managerial model of organizational effectiveness indicates what the manager seeks in subordinate work units, not what he seeks in his own unit.

The managerial model of organizational effectiveness is represented in Diagram 2. The model is somewhat more complex than the supervisory model developed above. Notice that the production criteria are again of central importance for managers as they were for supervisors. Productivity, however, is accompanied by the dimensions of planning, reliability and initiative which are also perceived as being somewhat independent of productivity and yet related to achieving organizational effectiveness. Productivity is achieved through supportive relationships and cohesive attitudes within the organizational unit. Managers perceive unit planning as independently related to effectiveness and likely to be accompanied by cooperation with other units, good supervisory control of work progress and the willingness of the unit to try out unusual solutions to problems. This probably makes the better units appear a great deal more flexible to the manager.

The next relatively independent dimension perceived by managers as relevant for achieving effectiveness is the degree of reliability of the organizational unit. Not having to check on the units progress or to follow closely the units performance probably is perceived by the manager to be important so that he can devote his energies to other activities. Initiation is looked for by the manager as more in line with the long run interests of the organization and thus occupies a relatively independent and important fourth position in his conception of organization effectiveness. Both reliability and initiation are seen by the



managers as solitary dimensions; less well integrated into the maze of supporting dimensions but definitely related to achieving effectiveness.

Interpretation

It is important to notice both the differences and the similarities between these two models of organizational effectiveness. A consideration of the differences suggests the manager appears to desire
subordinate units that are productive and also are characterized by
planning, reliable performance and initiative. Supervisors appear to
understand only the demand for productive performance. Other criteria
are relevant only in aiding in the achievement of productive performance. One possible reason for this lack of congruency between the two
models may lie in the reward system of organizations. Production criteria are available at short-run intervals, are relatively indisputable,
and probably form the basis for rewarding supervisors. The other criteria, although desired by managers, are more subjective and tend to be
noticed only when something goes wrong. Thus they probably are not
used consistently in the reward system, and the supervisor is less aware
of the importance attached to them by the manager.

The differences in the two models of organizational effectiveness also may reflect differences in the work situations of the manager and the supervisor. As the man with direct, "hands on" contact with the workforce and the technology, the supervisor must be concerned with short run variations in performance and must constantly take action to affect performance in the short run. The manager, on the other hand, is one level removed from the work force and the technology and can take a more long run approach to his responsibilities. In addition to having



more than one unit under his direction, the manager is concerned with total production of all units and is not quite as geared to short run productivity in each. Organizational criteria relating to long run performance -- initiative, reliability, planning -- can take on importance for the manager in a different way than they do for the supervisor. Perhaps this is due to the different degree of freedom in the two situations. The manager can consider other variables independent of short run production.

The organizational dimensions related most closely to concepts of human relations are perceived as instrumental in both models. Neither managers nor supervisors perceive these dimensions as independent criteria of organizational effectiveness. Supervisory training in human relations apparently did not convince the first-line supervisors of the independent value of these dimensions. Perhaps the training developed their skills to influence the human relations dimensions and thus achieve production criteria. Perhaps the training assisted the supervisors in understanding better the goals and desires of their superiors. Unfortunately, the supervisory perceptions of organizational effectiveness at the start of the course are not known and so one can not assess the change brought about through training.

While the first-line supervisor may be the "man in the middle" caught between managerial and work force pressures, his criteria of organizational effectiveness appear generally reflective of managerial perceptions and goals. A comparison of the two models shows that the four dimensions of the managerial model can also be found in the supervisory model (See the underlined dimensions in Diagram 1). Reliability



is related to effectiveness through the dimension "support". Initiative, though more closely related to development and flexibility, still has a low but significant relationship to overall effectiveness. While his model of organizational effectiveness does not reflect fully that of the manager, it appears even less reflective of what one might expect the model of the work force to be.

Conclusion

Although he is the "man in the middle" in many respects, this research suggests that the supervisor's perceptions of the priorities in his job are more reflective of managerial priorities than what we might expect to be employee priorities. The supervisor, in fact, assigns less priority to human relations variables than does his superior. The supervisor tends to perceive human relations variables as instrumental in achieving productivity, not as ends in themselves. Assuming that supervisory values reflects assessment of the instrumental worth of these values; achievements in these human relations dimensions are useful in achieving long run productive performance.

Whether priority ought be accorded the human relations dimensions of organizations or not is a value decision which can not be answered through research. Many will agree that the human relations dimensions are important only as means to the economic performance dimensions; others will argue that the human relations dimensions ought be given priority as independent ends. Our findings suggest that supervisors, at least, tend to view the human relations dimensions of organizations as having only instrumental value. The supervisor does not appear to have been affected much by the numerous arguments concerning the appropriate ends of business organizations.



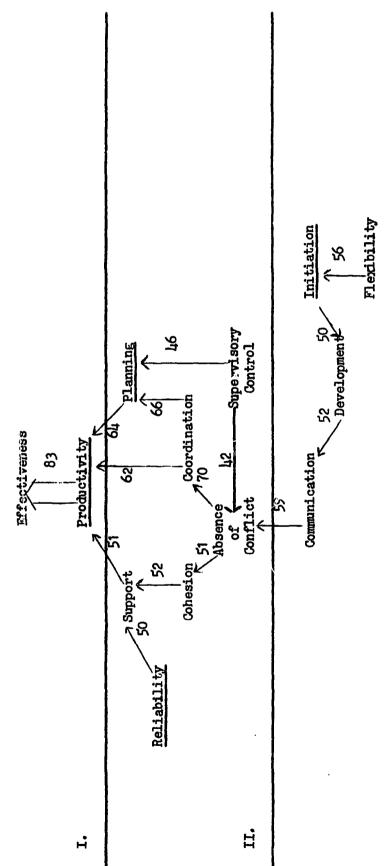
Figure 1: Dimensions of Organizational Performance

- FLEXIBILITY willingness to tackle unusual problems, try out new ideas.
- 2. DEVELOPMENT personnel participate in training and development
- 3. COHESION lack of complaints, grievances, conflict
- 4. DEMOCRATIC SUPERVISION subordinate participation in work decisions
- 5. RELIABILITY completion of assignments without checking
- 6. DELEGATION delegation of responsibility by supervisors
- 7. BARGAINING negotiation with other units for favors, cooperation
- 8. RESULTS EMPHASIS results, not procedures, emphasized
- 9. STAFFING personnel flexibility among jobs, back-ups available
- 10. COOPERATION responsibilities met and work coordinated with other units
- 11. DECENTRALIZATION work decisions made at low levels
- 12. CONFLICT conflict with other units over responsibility and authority
- 13. SUPERVISORY BACKING supervisors back up subordinates
- 14. PLANNING waste time avoided through planning and scheduling
- 15. PRODUCTIVITY efficiency of performance within unit
- 16. SUPPORT mutual support of supervisors and subordinates
- 17. COMMUNICATION flow of work information
- 18. INITIATION initiates improvements in work methods
- 19. SUPERVISORY CONTROL supervisors in control of work progress



Diagram 1: Supervisory View

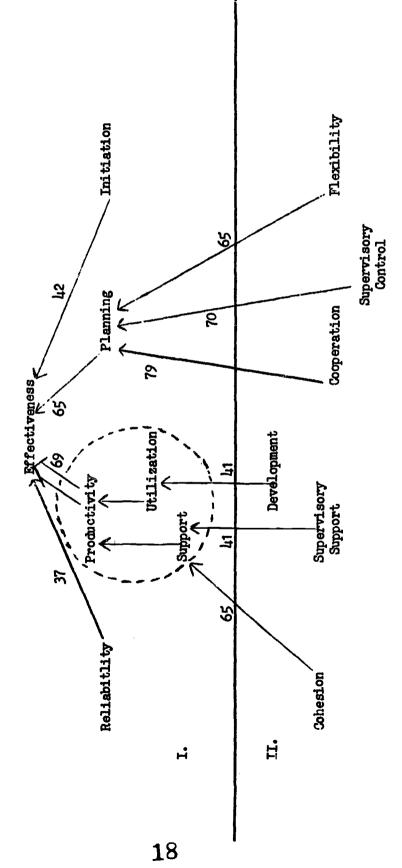
Correlations have been inserted in the diagram to give some indication of the relationship between each dimension. The probability of correlations this large or larger occurring by chance is less than one time in one hundred.



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Diagram 2: Managerial Model

relationship between each dimension. Productivity - support - utilization were all part of the same dimension in this model. The probability of correlations this large or larger occurring by chance is less than one time in one hundred. Correlations have been inserted in the diagram to give some indication of the





REFERENCES

- 1. E. A. Fleishman, E. F. Harris and H. E. Burtt. <u>Leadership and Supervision in Industry: An Evaluation of a Supervisory Training Program.</u> Ohio State University, Bureau of Educational Research, 1955.
- 2. T. A. Mahoney and W. Weitzel. "Managerial Models of Organizational Effectiveness", Administrative Science Quarterly (September) 1969, Vol. 14, No. 3, pp. 357-365.



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