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Work Related Communication, Environmental Uncertainty, and Subunit Effectiveness: A Second Look at the Information Processing Approach to Subunit Communication

Abstract

The article discusses communication in organizations and looks at the effectiveness of contingency theory in analyzing operational research. The author critiques earlier research in this area, specifically by Boehm, Zedeck, and Tushman. She uses data from 90 of 100 subunits of a midwest state Extension Service. Questionnaires were sent out to assess work-related communications and information exchanges between the subunits, environmental conditions within each subunit, and the effectiveness of each office.

Disciplines

Business Administration, Management, and Operations | Business Intelligence | Business Law, Public Responsibility, and Ethics | Management Information Systems | Management Sciences and Quantitative Methods

Comments

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Research Notes

WORK RELATED COMMUNICATION, ENVIRONMENTAL UNCERTAINTY, AND SUBUNIT EFFECTIVENESS: A SECOND LOOK AT THE INFORMATION PROCESSING APPROACH TO SUBUNIT COMMUNICATION

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A contingency approach is one of the most common perspectives evident in contemporary organizational research. Organizational communication researchers have not been immune to the influence of contingency thought and have embraced it in the form of a general information processing model of organizational design (Tushman & Nadler, 1978). Tushman (1978, 1979a, 1979b) has attempted to explore the utility of this model by examining its capacity to explain organizational subunit effectiveness. The purposes of this paper are (1) to replicate a portion of this work in a different sample of organizational subunits (i.e., assess external validity), (2) to evaluate the impact of an additional task environment variable heretofore unconsidered (environmental complexity), (3) to expand the number and type of subunit effectiveness criteria to reflect the multidimensional nature of effectiveness, and (4) to propose a more rigorous test for the empirical examination of hypothesized contingency relationships.

Organizational (subunit) contingency theories traditionally have argued that when contextual variables (e.g., technology, environmental conditions) are matched with appropriate organizational arrangements (e.g., centralization, communication), effectiveness of the unit will be enhanced. An empirical assessment of this set of interrelationships generally is termed a test of the congruency hypothesis. In organizational communication research, the congruency hypothesis has focused on matching information processing capacities (e.g., unit communication practices) with information processing requirements (e.g., characteristics of the unit's work such as routineness and/or task environment conditions such as change or complexity). Matching requirements with capacities is said to promote effectiveness (Tushman & Nadler, 1978). The logic behind this model rests on the assumptions that nonroutineness and unstable environmental conditions directly increase uncertainty and indirectly increase information processing requirements. More frequent, decentralized, or organismic communication practices, (i.e., techniques for improving information processing capacity) are presumed to increase the unit's ability to handle uncertainty. Units facing high uncertainty that are able to develop

organismic communication practices thus should be able to offset at least some of the uncertainty effects, reduce equivocality, and manifest higher effectiveness than units facing high uncertainty that maintain more mechanistic communication practices. Furthermore, the contingency principle should hold for units facing low levels of uncertainty and low information processing requirements. Because techniques for improving information processing capacity are time consuming and expensive (Tushman & Nadler, 1978), units with low information requirements that promote organismic communication practices should be less effective than units with low information requirements that divert their resources to other areas. In short, effectiveness should be optimized when high information requirements are matched with high information capacity and when low information requirements are matched with low information capacity.

There are few empirical studies of this communication based congruency hypothesis. Tushman (1979b) has reviewed some early work by Burns and Stalker (1961) and others that does imply that more successful units facing turbulent environments have been characterized by more intense communication practices. However, none of these studies, as Tushman points out, deals with communication between different parts of the organization or with units outside the organization. Tushman's (1977, 1978, 1979a, 1979b) own work has served to ameliorate these and other deficiencies by his consideration of multiple communication areas and patterns. These studies, based on the same data set, have provided some support for the congruency hypothesis outlined in information processing terms. Clearly, Tushman's approach merits further empirical consideration.

In an effort to evaluate further the information processing approach, the congruency hypothesis was reevaluated in a sample of nonprofit organizational subunits. Tushman's (1979b) investigation of research and development subunits served as a basis for comparison. In both studies information processing capacity is measured by work related communication practices. Tushman's intraproject communication measure is paired with an intraunit communication measure, project to laboratory communication is equated with unit to regional office communication, and project to operational areas communication (suppliers, customers) is matched with unit to county sources communication. A leader approval (performance) rating also was used in each study. Tushman's analysis is extended by incorporation of a second task environment uncertainty concept, environmental complexity, and by multiple measures of subunit effectiveness.

An additional modification concerns the data analysis procedure used to test the congruency hypothesis. Tushman evaluated the hypothesis by comparing mean communication variable scores of high performing units facing uncertain conditions to those of high performing units facing more certain conditions. By demonstrating that higher performing units in the uncertain condition possessed significantly more of the predesignated organismic communication practice, Tushman hoped to conclude that his

data supported the contingency model. More rigorous tests of the hypothesis might have been employed by casting the congruency hypothesis as a moderator variable question (Zedeck, 1971).

If the congruency hypothesis as presently formulated is valid, low performing units should be characterized by a less appropriate match, as indicated by an inverse relationship between uncertainty and communication measures, and high performing units should demonstrate an appropriate fit as evidenced by a positive relationship between the measures. Furthermore, the difference between the two correlations should be significantly different. An alternative, less stringent test, sometimes termed single group validity (Boehm, 1972), would be to require that only one correlation be statistically significant in the predicted direction and the other not be significantly different from zero (Zedeck, 1971). The moderator approach was adopted as a final effort to refine and extend Tushman's work.

Procedures

Sample and Data Collection Techniques—Usable data were obtained on 90 of 100 subunits of a midwest state Extension Service. These subunits provide a diverse number of educational programs and services to meet the needs of their predominately rural and agriculturally oriented clientele. The state organization is subdivided into three levels: a county or subunit level, an area level consisting of 12 regional offices, and a state or central administration level. In addition, each county unit is advised and partially controlled by a local citizens' advisory board. The chief administrator of each subunit, the executive officer of each subunit's citizens' board, and the chief administrator of each regional office completed mailed or personally administered questionnaires. Participants were asked to adopt a subunit perspective in formulating their responses and were assumed capable of providing valid information about subunit characteristics.

Measures—(1) Work related communication: Each subunit administrator provided a rating of the extent to which his unit (a) engages in intra-unit communication and information exchanges (two items), (b) exchanges useful information with regional office personnel (four items), and (c) exchanges useful information with county representatives and residents (five items). Measures for these three communication domains were found to be adequately reliable (α s = .81 to .86) and reasonably independent of one another (r s = .04 to .21).

(2) Environmental conditions: (a) Environmental change was operationally defined as the degree of demographic change from 1960 to 1970 in the county affiliated with each subunit. It was measured by using Census data describing the absolute percent change in county population and the absolute percent change in county population over 18 years of age during the specified period. (b) Environmental complexity was measured by asking each subunit administrator to evaluate the extent to which he perceives

the county environment to be unpredictable and the extent to which he has inadequate information for decision making (three items). Reliability values for the two environmental measures were .86 and .60 respectively. These measures were observed to be empirically distinct ($r = .07$).

(3) Effectiveness: (a) The regional office administrator rated the effectiveness of each subunit located in his jurisdiction by completing a 6-item leader approval measure focusing on his evaluation of the quality of programs offered by the subunit and the ability of the subunit to operate independently. (b) Goal attainment and (c) efficiency were evaluated by the subunit administrator. The goal measure (seven items) emphasized the extent to which programs provided were consistent with predetermined objectives; the efficiency measure (two items) stressed optimal use of staff time and resources. (d) The citizens' advisory board officer provided the community approval measure by completing nine items related to his perception of how satisfied county residents were with subunit programs and services. All of the effectiveness measures manifested adequate reliability ($\alpha = .84$ to $.91$) with the exception of efficiency ($\alpha = .47$). In addition, these measures were found to be reasonably independent of one another ($rs = .04$ to $.26$). Effectiveness scores for each type of effectiveness were split at the median in order to create high and low categories.

Results

Results of this study can be approached from three perspectives: (1) a comparison of Tushman's (1979b) environmental change findings with present findings; (2) a review of findings connected with the second component of task environment, environmental complexity; and (3) an evaluation of whether subunits manifesting high effectiveness more often demonstrate a congruent fit between their information processing requirements (level of environmental uncertainty) and their information processing capacities (work related communication practices) than do less effective subunits.

(1) Based on the information processing model, Tushman hypothesized that high performing subunits would demonstrate a positive relationship between environmental change and (a) project and (b) operational communication. His data, like the present findings, failed to support this hypothesis. Environmental change and all three forms of work related communication were found to be unrelated regardless of the level of leader approval (Table 1). The same pattern of findings was generally repeated when other measures of effectiveness were considered. Only among subunits with high levels of efficiency was environmental change observed to be positively related to intraunit communication ($r = .29$). This lone supportive finding was offset by evidence of a positive relationship between environmental change and intraunit communication among subunits with low community approval effectiveness ($r = .28$). Conditions in which frequent change is matched with frequent intraunit communication should

TABLE 1
Correlations Between Environmental Variables and
Work Related Communication, Controlling for Four Measures
of Subunit Effectiveness

Work Related Communication, Controlling on Effectiveness	Environmental Change			Environmental Complexity		
	Total (N=90)	High ^a (Ns=42-47)	Low ^a (Ns=43-48)	Total (N=90)	High ^a (Ns=42-47)	Low ^a (Ns=43-48)
Leader approval						
ES unit	.10	.08	.15	-.15	-.02	-.26*
Regional office	.10	.07	.13	-.16	-.01	-.28*
County sources	-.02	-.01	-.08	-.02	-.02	-.00
Goal attainment						
ES unit	.10	.17	.02	-.15	-.29*	.05 ^c
Regional office	.10	.12	.09	-.16	-.16	-.14
County sources	-.02	.08	-.11	-.02	.21	-.06
Community approval						
ES unit	.10	-.16	.28*, ^b	-.15	-.11	-.20
Regional office	.10	.02	.17	-.16	-.21	-.12
County sources	-.02	.01	-.01	-.02	.25*	-.16 ^b
Efficiency						
ES unit	.10	.29*	-.02 ^c	-.15	-.26*	-.11
Regional office	.10	.04	.17	-.16	-.14	-.15
County sources	-.02	-.05	-.03	-.02	-.08	-.03

^aNs are unequal because of tied scores.

^bSignificant difference between high and low correlations, $p \leq .05$.

^cSignificant difference between high and low correlations, $p \leq .10$.

* $p \leq .05$, one-tailed test

not characterize relatively ineffective subunits. These data thus suggest that contrary to information processing and congruency notions, subunits do not attempt to reduce change induced uncertainty by increasing work related communication to any specific domain.

(2) By extending information processing ideas from environmental change to environmental complexity, it is reasonable to postulate that highly effective subunits will display positive relationships between complexity and communication and less effective units will demonstrate negative relationships. Across the four types of effectiveness, five significant ($p \leq .05$) relationships were found but only three were supportive of the hypothesized fit. Significant inverse relationships were observed between environmental complexity and (a) intraunit ($r = -.26$) and (b) regional office communication ($r = -.28$) among subunits with low leader approval. A positive relationship between complexity and county communication was noted among subunits with high community approval ($r = .25$). Significant findings opposite to those predicted occurred under conditions of high goal attainment and efficiency. They imply that high environmental complexity with its attendant uncertainty can be reduced through lower intra-unit communication. In summary, as only 3 of 24 examinations of the congruency hypothesis based on environmental complexity were supportive, this hypothesized contingency must also be rejected.

(3) The small number of statistically significant findings makes the more rigorous moderator tests nearly superfluous. Nevertheless, the

analysis is presented for technical completeness and as a means of illustrating the more critical evaluation procedure. Correlations between each environmental variable and form of work related communication for subunits high in each type of effectiveness and for subunits low in the same type of effectiveness were compared and tested for significant differences or evidence of single group validity. Four correlations met the standards for single group validity, and two of these met the more rigorous requirement of statistically significant differences in the direction postulated. Single group validity was demonstrated in the relationship between environmental complexity and (a) intraunit communication and (b) regional office communication, using leader approval as the moderator. The two correlations meeting the additional standard involved completely different combinations of factors. Subunits high in community approval were significantly more likely to respond to high environmental complexity with frequent county source communication ($r = .25$) than subunits low in community approval ($r = -.16$). A similar set of relationships was evident among environmental change, intraunit communication, and efficiency. More efficient subunits engaged in more intraunit communication when environmental change was rapid ($r = .29$) than did inefficient units ($r = -.02$). By reporting a significant difference between the correlations under the high and low effectiveness conditions, greater confidence in the ability of a congruent combination of environmental conditions and communication practices to promote effectiveness was achieved. Unfortunately, only two such environmental-communication combinations were uncovered in this research.

Summary and Discussion

A purpose of this study was to replicate Tushman's (1979b) examination of the relationships among environmental change, work related communication, and subunit effectiveness in a different sample and with a more rigorous data analysis procedure. Based on an information processing model of organizational communication, *it was hypothesized that a subunit would be more effective when its communication practices matched the level of uncertainty confronting the subunit*. Neither study found support for the notion that effectiveness could be enhanced by increasing communication under turbulent environmental conditions or by decreasing communication under stable conditions. In addition, the examination of a second environmental uncertainty condition (complexity) and multiple measures of effectiveness did not alter this conclusion. In short, the results of Tushman's initial study were found to be generalizable but opposite from those postulated on conceptual grounds.

Tushman's findings and those of this study suggest that a relatively simple two-way contingency (i.e., matching the uncertainty of environmental conditions with appropriate communication patterns) is not sufficient to explain variation in subunit effectiveness. Subsequent research may show

that there are no systematic linkages among effectiveness, communication, and uncertainty, but such a conclusion probably is premature. Tushman (1979a, 1979b), for example, has generated more supportive findings for the information processing model through incorporation of subunit task variability as an additional measure of uncertainty. Task variability could not be considered in this study because the subunits did not demonstrate sufficient variance along this dimension. In addition, Tushman suggests certain refinements to his model (e.g., the reduction of uncertainty stemming from environmental variability may be more effectively handled by a few key boundary spanning individuals rather than by indiscriminate increases in external communication). These possibilities, as well as some others, warrant additional empirical investigation.

The issue of external communication with whom seems crucial for the reduction of environmental uncertainty. The present study considered only two external communication sources and not necessarily optimal ones for mitigating the effects of uncertainty. Communication with other Extension subunits or other organizations located within the subunit jurisdiction might have been more useful. Local government and social service organizations as well as private agrarian enterprises, for example, may be able to detect environmental fluctuations important to effectiveness (e.g., changes in the number of unemployed residents, emergence of new factors affecting market conditions) faster than can the Extension staff. In other words, subunits facing high uncertainty may be more effective if they establish and maintain a communication network that includes those intra- and inter-organizational sources that can best contribute to their understanding of the environment. Perhaps the present research and Tushman's (1979b) inquiry failed to yield supportive findings because they failed to include a critical communication source capable of providing valid and unique information to subunits functioning in uncertain settings. In sum, the "with whom" aspect of information processing requirements merits more consideration and perhaps also will serve to advance the study of a rather neglected topic, interorganizational (extra-organizational) communication.

Another alternative explanation for the nonsupportive findings in these studies involves the implicit assumption of the information processing model that subunits will use the information communicated to them to enhance their effectiveness. The lack of supportive evidence reported may be partially attributable to the existence of constraints or attributes that prohibit a subunit in an uncertain environment from responding appropriately to present conditions (e.g., government regulations limiting the extent of Extension operations, resistance to change among subunit leaders). Alternately expressed, subunits may be able to establish communication patterns highly consonant with their environmental needs but may sometimes be unable to take advantage of their congruent design. Similarly, there is no guarantee that the subunit in the simple, predictable environment will transfer resources that might be spent on communication to

activities that would result in greater effectiveness. Case studies of information utilization by subunits and organizations might help assess the validity of this explanation and the degree to which it threatens the information processing model. Finally, it should be recognized that aspects of the model may be incomplete and that some elaboration or revision may be necessary in order to account for the findings reported by Tushman (1979b) and herein.

In summary, it is not recommended that the contingency or information processing approach be abandoned. Rather, the findings point to the need for greater specificity and elaboration in the study of communication design. Organizational communication has sorely lagged behind other organizational research topics in the formulation of conceptual frameworks useful in promoting empirical inquiry. The Tushman and Nadler (1978) model represents a long needed shot in the arm for the area and continues to be a viable source of testable hypotheses worthy of investigation. Even if the model and the general contingency approach are judged ultimately to be a hollow frontier for the study of organizational communication, the research stimulation resulting from its existence is likely to overshadow any misconceptions temporarily embraced concerning the nature of organizational and subunit communication.

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