This article tests a model of the influence of chief executive support on innovation outcomes in local government organizations. Propositions taken from the literature are causally ordered and tested using path analysis. The model is weakly supported by the analysis. Several explanations are offered for the results.

CHIEF EXECUTIVE SUPPORT AND INNOVATION ADOPTION

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Although it is increasingly acknowledged that chief executives play an important role in the adoption of innovations (Feller and Menzel, 1975; Yin et al., 1976; Dutton and Kraemer, 1978), the influence of executive support vis-à-vis other actors and organizational processes remains unclear. Yin et al. (1976) suggest that the study of these relationships is complicated because the major actors in state and local government innovation are difficult to identify. Furthermore, Feller and Menzel (1975) conclude from their research that technological

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leadership in local government is a characteristic of specific functional agencies, and not an organizationwide phenomenon. This conclusion could be interpreted as implying that the chief executive's influence in local government is negligible, but the opposite interpretation is not precluded by Feller and Menzel's assessment. Moreover, Yin et al. (1976: 74) argue:

> Although it is generally useful to analyze the activities of a police department or a public health agency as an autonomous organization, such an agency is highly dependent on the general jurisdiction and its "overhead" agencies and executives, e.g., the local legislative body, the chief executive of the jurisdiction, and such related staff offices as the budget bureau.

If local government executives are indeed members of a set of important actors in innovation, an understanding of the processes by which executive support influences innovation outcomes serves as an important complement to understanding the determinants of that support (Perry and Kraemer, 1977; Dutton and Kraemer, 1978). Our approach here is to develop an explicit model of the executive's influence in innovation adoption based on implicit models in the literature. We then test the model in the particular context of computer applications software.

THEORETICAL FRAMEWORK

In order to develop an explicit model, we reviewed the major studies on the chief executive's role in the innovation process. The purpose was to (1) define concepts and variables relevant to chief executive influence in innovation and (2) identify propositions which define the causal ordering among variables in a model of chief executive influence. Although the literature abounds with models of organizational innovation, two general models are distinguishable foci of research: the organization structure and the organization process models.

The organization structure model focuses on the association between attributes of organization structure, such as size and differentiation, and innovation viewed as an organizational outcome (Moch, 1976; Hage and Aiken, 1967). The rationale for this model is that organizational structures set the parameters for activities which influce decisions whether or not to adopt a new technology. Organizational structure may itself be contingent upon environmental factors, so the structural theorists frequently incorporate "open" systems features into their models.

In contrast, organization process models focus on innovative behavior in organizations and the conditions which surround it. Critical variables from the perspective of the process theorists are slack resources, structural looseness, group processes, professionalism, and freedom from external pressures (Thompson, 1965). This model tends to treat innovation as an outgrowth of internal organizational dynamics rather than as the result of structural and environmental contingencies.

The literature review indicates that the role of the chief executive in local governmental innovation has been approached primarily from the organization-process rather than the organization-structure perspective. Table 1 summarizes eight propositions that were encountered in the literature.

These eight propositions can be organized around four broad theoretical concepts: organization climate, resources, decision-making process, and innovation outcomes. These concepts and propositions are reviewed next.

ORGANIZATIONAL CLIMATE

Rogers and Agarwala-Rogers (1976: 75) note that "an organization's climate exerts a strong influence on its members' behavior." Organizational climate is used predominantly as an organizing concept for a cluster of internal organizational variables which are considered generally to affect

TABLE 1
Summary of Propositions Relating Executive Support to Innovation in Government Organizations

I.	Executive branch pressure on agencies to restrain budgets and improve productivity is related to agency search for labor-saving techniques (Feller & Menzel, 1975).
II.	Executive support of specific techniques is related to agency innovation (Feller & Menzel, 1975).
III.	Executive motivation to innovate is related to innovation adoption and progressive programs (Mohr, 1969).
IV.	Top management support of the project and the project's entire context is related to client willingness to support implementation (Radnor, Rubenstein & Tansik, 1970).
V.	Top management support of the project and of the project's entire context is related to availability of money and personnel for implementation (Radnor, Rubenstein & Tansik, 1970).
VI.	The top management system of variables is related to top management support of the project and of the project's entire context (Radnor, Rubenstein & Tansik, 1970).
VII.	Relevant past outcomes are related to top management support of the project and of the project's entire context (Radnor, Rubenstein & Tansik, 1970).
VIII.	Chief executive support is related to innovation incorporation (Yin, et al., 1976).

behavior by influencing "the valences attached to certain outcomes, the instrumentalities for these outcomes, and expectations for various strategies to achieve these outcomes" (James and Jones, 1974: 1096-1097).

Among the propositions in Table 1, three dimensions of organizational climate relevant to the innovation adoption process are suggested. Propositions I and III refer to executive pressures or norms that might generally stimulate technological innovation. The specific norms mentioned in these propositions—restraints on budgets, emphasis on productivity, and motivation to innovate—suggest the broad notion of professionalism. Professional norms may contribute to innovation by encouraging organizational members to maintain familiarity with new techniques and methods in their fields, by enhancing efficient use of resources so that slack may be

created for innovative activity, and by facilitating objective assessments of problems or performance gaps.

Propositions II, IV, V, and VIII deal directly with the influence of executive support for a specific technology. The varying units used in these propositions—"executive branch," "top-management," "chief executive"—suggest the importance of several sources of executive support. The chief executive's support may be crucial because of his control of discretionary resources and because of the legitimacy which the chief executive's support lends to any organizational activity. Simultaneously, the favorability of the climate created by legislative and department head support of a particular technology will probably also influence the innovation behavior of organization members.

In their discussion of management science implementation, Radnor et al. (1970) introduce two concepts they believe are associated with executive support: the top-management system of variables and relevant past outcomes. Although these concepts are not fully defined in their study, it might be inferred from their use that the top-management system of variables refers to the homogeneity of top management support, and relevant past outcomes refer to the developmental status of the technology within the organization. Homogeneity of support should probably influence the willingness of lower-level organization members to initiate and follow through on innovative activities as well as reduce the likelihood of deadlock in decision making among organizational leaders. The developmental status of the technology will influence the availability of the "critical mass" of resources necessary for innovation and the "routinization" of innovation processes.

RESOURCES

Two uses of the resource concept are prominent in the innovation literature. First, there is the notion of resource allocation for innovative activity, what Rogers and Agarwala-Rogers (1976: 161) term "deliberately created" resources "that

are not committed to other purposes." This might be considered the distributive connotation of the term. A second term, slack resources, refers to resources in a redistributive sense. Slack resources represent underutilized or unproductive resources already committed to activities within the organization (Cyert and March, 1963; Yin et al., 1976). Slack resources frequently refers both to the ability of the organization to create new resources and to its ability to reallocate existing resources.

Proposition V (Table 1) links top-management support to the availability of resources required for innovation. The availability of resources may refer to either of the foregoing two uses of the resource concept.

DECISION MAKING PROCESSES

The central concept about decision-making processes emphasized in the studies reviewed is user involvement or participation. Yin et al. (1976: 150), while not directly linking chief-executive support to user involvement, note that "the most important implementation factor was the presence of client participation, though some evidence was found that practitioner training was also important." Hage and Aiken (1967) similarly found a strong positive relationship between participation in agencywide decisions and program change in sixteen social welfare organizations.

Propositions I and IV (Table 1) suggest that executive pressures and top-management support stimulate two types of behavior by lower-level organizational participants—the search for labor-saving techniques and willingness to support innovation implementation. These two concepts can be conceived more generally as user involvement or participation in the innovation process.

INNOVATION OUTCOMES

The implied conceptualization of innovation outcomes in the propositions in Table 1 is confined primarily to innovation adoption, i.e., "the successful introduction into an applied

situation of means and ends that are new to that situation" (Mohr, 1969: 112). Although recent research suggests that innovation is a multidimensional concept which includes not only adoption, but implementation and use as well (Rogers and Eveland, 1976), we limit our analysis to the adoption dimension. We do, however, recognize that executive support might influence both whether an innovation is adopted and how widespread adoption activity is within the local organization. Thus, executive support may influence both the magnitude (frequency) and scope (pervasiveness) of innovation.

METHODOLOGY

THE CAUSAL MODEL

This discussion and analysis of the literature is translated in Figure 1 into a testable model of top management's influence on local-government innovation. To simplify the figure, arrows have not been drawn showing the relationships between the variables. Two organizational system variables, development status and professionalism, and three management attitude variables (chief executive support, climate favorability, and climate homogeneity) determine the amount of resources allocated and the availability of slack resources. Climate favorability represents the attitudes of elected officials and department heads toward data processing. Climate homogeneity represents the level of agreement among the attitudes of these two sets of officials. User involvement is conceived as an intervening variable between the causally antecedent organizational climate and resource variables, and innovation outcomes. Innovation magnitude represents the number of adoptions within the organization. Innovation scope refers to how concentrated or diffuse the distribution of innovation adoption is within the organization.

By specifying the relationships among the variables that are not causally ordered (e.g., resource allocation and slack

resources), path analysis can be used to test the plausibility of the model derived from the propositions in Table 1. If each variable in Figure 1 is assumed to be a linear combination of the variables that precede it, only the relationships among the organizational climate variables and among the resource variables require further specification. Following path analysis conventions, the relationships among the five exogenous organizational climate variables are treated as bidirectional correlations. Since the literature suggests that slack resources are a function of overall resource availability, slack resources are assumed to be causally dependent upon the level of resource allocation.

DATA SOURCES

In order to test our causal model, we used data from a nationwide survey of computing innovation in 713 city (over 50,000 population) and county (over 100,000 population) governments in the United States. The chief executives were mayors, city managers, county executives, and county administrators. Separate questionnaires were distributed to chief executives and data-processing installation managers. Secondary data from the *1972 City and County Data Book* were also used. The next section discusses the individual measures derived from these data sources.

MEASUREMENT OF THE VARIABLES

The chief-executive support index taps the difference between the executive's perception of the expected utility of computing innovation and the executive's perception of the current utility of the technology. The more positive the difference between the executive's perception of expected and current utility, the greater his support; the more negative the difference, the less his support. The derivation of the current and expected utility scales is explained in Perry and Kraemer (1977).

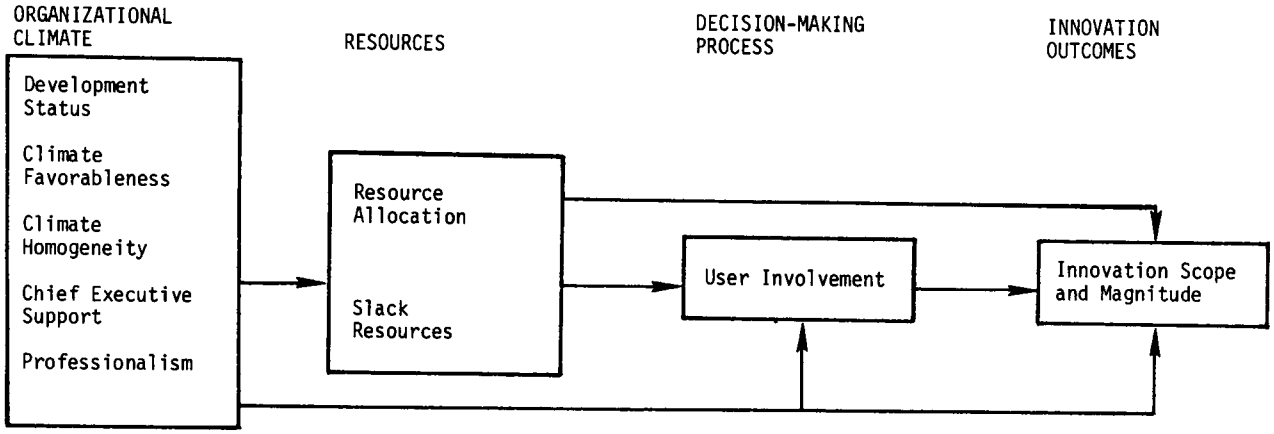

Figure 1: Causal Model of Executive Influence on Local Government Innovation

Development status was measured by a four-point Guttman scale composed of different information-processing tasks. The information-processing tasks are indicative of a progression from minor to major restructuring of the information flows within the organization. The coefficient of reproducibility for this Guttman scale is .93.

Professionalism was measured using several operating policies that reflect the existence of professional practices within the legislative and administrative components of the local government. Included in the index are scores for councilmembers' annual salaries, presence or absence of councilmember staff, number of services provided councilmembers, and the use by the organization of written program objectives and measures of performance.

Climate favorability and climate homogeneity were measured perceptually using responses of the chief executive to two Likert-scaled items. Chief executives were asked to respond to two items regarding the support of local legislators and department heads for the expansion of data processing. These scores were summed to create a climate favorability index with a coefficient alpha of .64. Climate homogeneity was measured by scaling the same two items according to the extent to which the chief executive perceived the attitudes of the legislators and department heads as differing from one another. For example, if the chief executive perceived the legislative body as strongly opposed to the expansion of data processing, but department heads as strongly favorable to its expansion, a score of one was assigned to reflect complete lack of agreement between elected officials and department heads. A score of four was assigned to represent complete agreement.

Unobtrusive measures were used to operationalize the resource variables. The natural log of the local government's data-processing budget tapped the level of resource allocation. Slack resources were measured by summing the standard scores for two indicators. The first indicator, personnel slack, was measured by the ratio of actual data-processing personnel

to authorized personnel. The second indicator was a measure of machine slack, operationalized by the amount of computer core space available in the city or county.

User involvement was created by summing the standard scores or indices of user participation in four computer application activities: adoption, design, development, and evaluation. The indices were based on the responses of data processing directors to thirteen questionnaire items.

The number of computer applications in development was used to measure innovation adoption. Since many of the organizations in the survey had automated some information-processing tasks, corrections had to be made for existing applications. Innovation magnitude was operationalized by dividing the total number of applications in development by the total number of tasks not previously automated. The scope of innovation was measured by dividing the number of functional units (e.g., police, fire, libraries) which for the first time were engaged in developing automated applications by the number of functional units that could potentially be automated.

RESULTS

Two questions were considered in analyzing the relationships in Figure 1. First, to what extent does the organizational process model predict innovation outcomes in local governments? This question was investigated using multiple linear regression analysis. Second, and more central to the present study, can specific relationships proposed in the literature be empirically supported? The latter question was explored by means of path analysis.

Overall, the organizational process variables identified in the public sector innovation literature are weak predictors of innovation outcomes. The R^2 for innovation magnitude using the predictors in Figure 2 is .11; the R^2 for innovation scope is

.04 when the variables in Figure 3 are used as predictors. These results raise serious questions about the utility of the organizational process model for predicting local-government innovation.

The results of the path analysis for innovation magnitude and for innovation scope are presented in Figures 2 and 3, respectively. Because climate homogeneity was not significantly related to either the intervening variables or the outcome variables, it was deleted from each path model. Similarly, chief-executive support and climate favorability were deleted from the path model for innovation magnitude, since they were not significantly related to any of the endogenous variables.

The two path models provide only moderate support for the set of propositions reviewed in Table 1. The direct path for chief-executive support (Proposition II) was significant, but only in the innovation scope model. The direct paths between chief-executive support and user supportiveness (Proposition IV), and resource availability (Proposition V) are not significant. These results cast doubt on the relationships between top-management support, and both resource availability and user supportiveness. Moreover, the bidirectional correlations among the top-management variables and development status and professionalism are extremely weak.

The most interesting result of the path analyses concerns the contrasting signs for the paths between innovation scope and the two independent variables, chief-executive support and climate favorability. The positive path for chief-executive support suggests that the chief executive's support is influential, not in the frequency of computer application adoption within the organization, but in its distribution across organizational subunits. The negative sign between climate favorability and innovation scope suggests that increasing levels of elected-official and department-head support of data processing actually constrain the spread of automation across departments.

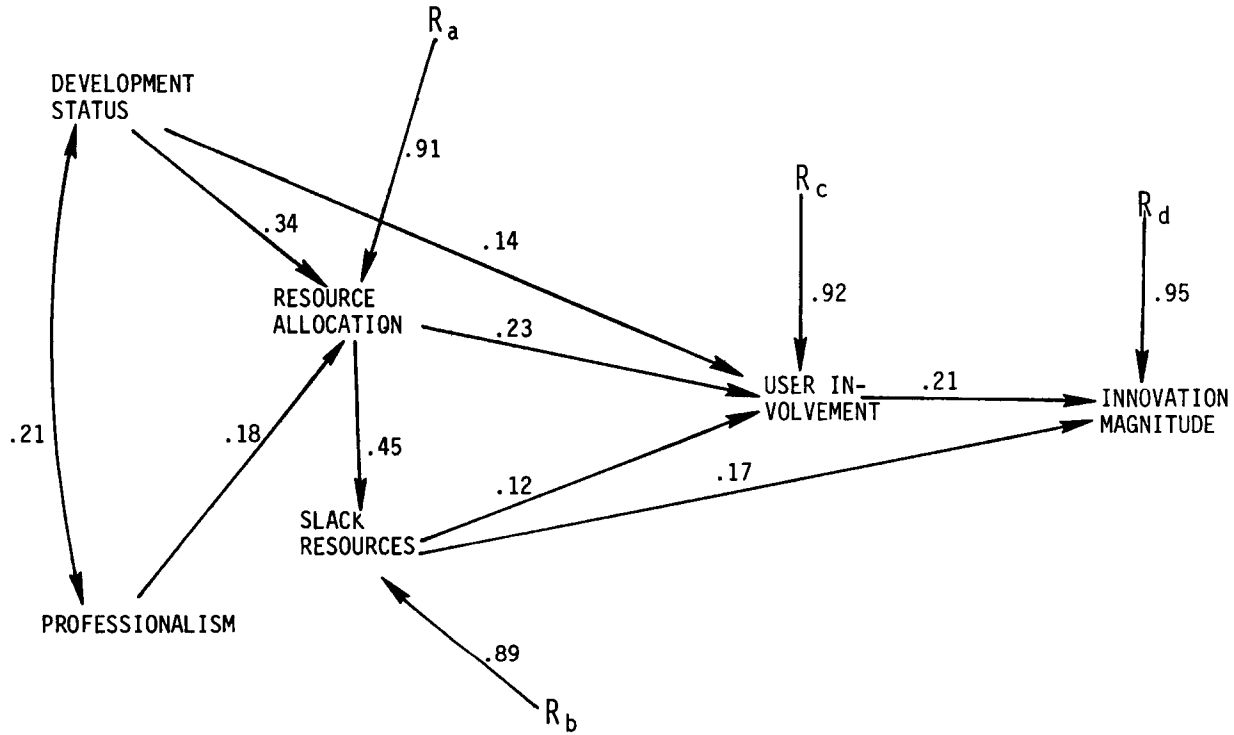

Figure 2: Path Model of Innovation Magnitude Showing Significant Paths Among the Study Variables

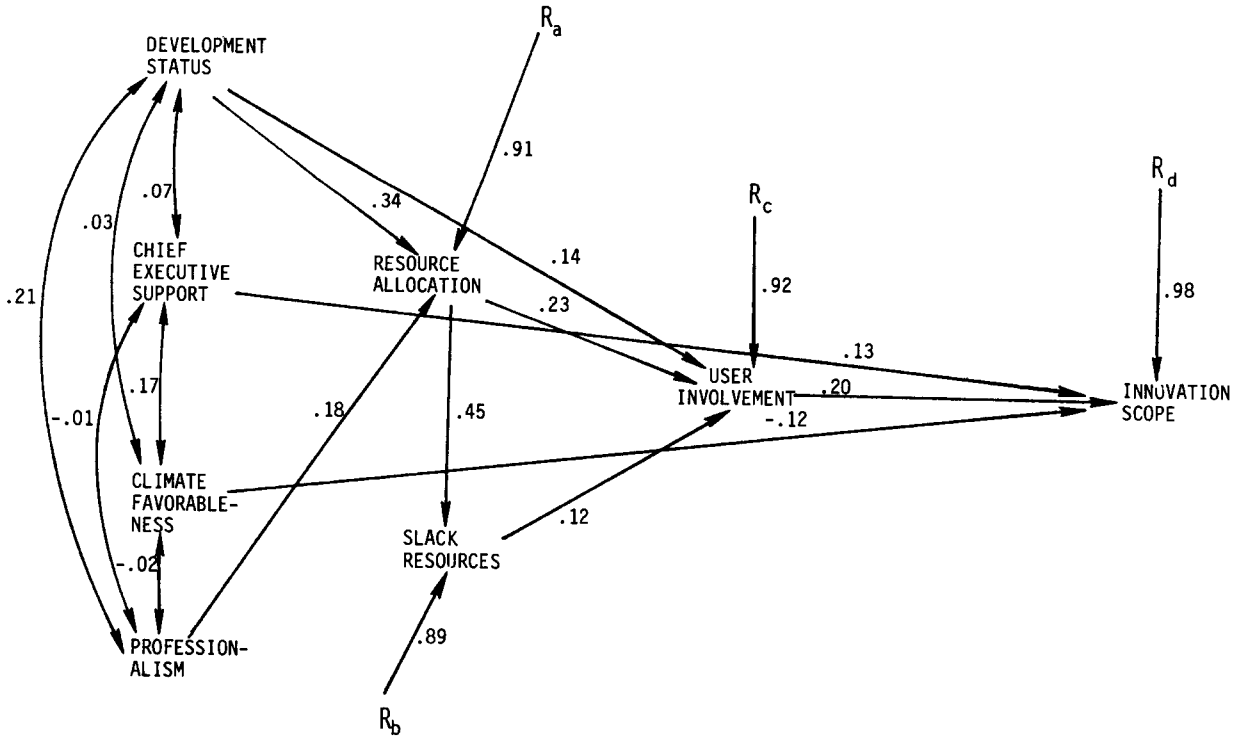

Figure 3: Path Model for Innovation Scope Showing Significant Paths Among the Study Variables

DISCUSSION

Our results cast substantial doubt upon the completeness and utility of the organizational process model for predicting innovative behavior. It seems likely that the organizational process model must be explored in concert with structural models in order to explain significant degrees of innovation. Other recent research tends to support this view (Bingham, 1975).

Our results also cast considerable doubt on prevailing notions about the significance of the chief executive in local-government innovation. The chief executive's support leads to no overall increase in innovation. Interestingly, chief-executive support does contribute to bringing more departments "on boards" as users of automated data processing.

Current theory implicitly predicts uniform impacts from support within top management. But the results for the innovation scope path model indicate that elected-official and department-head support have a negative effect on innovation scope. What might explain this contrast to current theory? Pettigrew's (1973) analysis of the organizational politics surrounding a large-scale computer innovation in a British firm provides one possible rationale. Pettigrew argues that computing innovations invoke political behavior because they frequently involve individuals or organizational subunits in making claims against the current distribution of organizational resources. Those resources may be salaries, new equipment, information, or control over resources or an area of operation. Any particular computing innovation may generate a demand for new resource allocations to an individual or subunit that has not previously been a claimant. And, consequently, current claimants might resist the introduction of the new innovation because they see their interests threatened by a potential change in the current distribution of resources.

Thus, the negative relationship between climate favorability and innovation scope might reflect the fact that data-processing innovations which reinforce existing patterns of resource

allocation in departments tend to get adopted more frequently than those which change existing patterns of resource allocation. This tendency for data-processing innovations to reinforce and strengthen existing patterns of resource allocation parallels their tendency to reinforce existing patterns of power and influence. In their study of power shifts resulting from computerized information systems in 42 cities, Kraemer and Dutton (1979) found that the systems tended to be power-reinforcing. That is, they increased the influence of city managers in city-manager cities, of mayors in strongly mayoral cities, and of department heads and planners in cities with decentralized and fragmented government structures.

Moreover, elected officials are likely to allocate resources for data processing just as they allocate resources for other goods and services—that is, differentially to organizational subunits in accordance with political advantage or need. Thus, for example, previously successful bureaucratic entrepreneurs will have a better chance of claiming new resources because they have demonstrated both need and the political advantage that comes with success. This explanation of the relationship between climate favorability and innovation scope is consistent with the framework of bureaucratic politics and technological change that Lambright and Flynn observed in Syracuse and Rochester, New York. Lambright and Flynn (1976: i) indicate that, because innovation adoption requires an allocation of new resources, "bureaucratic entrepreneurs seek to build a system of pressures around elected officials to obtain the decisions they want." Among these pressures are outside funding, "successful" demonstrations, publicity in the media, and alliances with community interest groups. The success of bureaucratic entrepreneurs in obtaining local adoption decisions is, in large part, due to their success or failure in creating such a system of pressures. And previous successes pave the way for new, additional successes.

Our findings clarify another aspect of the chief executive's role in innovation adoption—his potential contribution to unnecessary innovation adoption. In an earlier study (Perry

and Kraemer, 1977), we indicated that at least a portion of computing innovation in local government, due to ill-conceived chief-executive support, might be unnecessary and, possibly, counterproductive. Some chief executives, either because they are unrealistic about the problems with computing or because they suboptimize for personal gain, lend uncritical support to computing adoptions. Our current results indicate that a chief executive's support has no impact on adoption frequency and little impact on scope. Therefore, ill-conceived support from the chief executive would not appear to be responsible for unnecessary adoption.

CONCLUSIONS

The results of this study are revealing in several respects. First, the path models for innovation magnitude and scope did not support the overall system of relationships posited in the literature. The models did, however, reaffirm the importance of particular variables in the innovation process. Among these variables were slack resources and professionalism. Second, the predictive power of the user involvement variable indicates that particular types of organizational processes influence the magnitude and scope of innovation adoption within an organization. The prescriptive implication of this finding is that organizations could enhance their capacity to innovate through the creation of methods for client participation in the adoption, design, and evaluation of applications. Specifically, involving a broader array of clients, especially those not now served by computing, might enhance their capacity to innovate.

The results of this study reinforce Rogers's criticism of the "psychological bits" of research on innovation in organizations (Rogers, 1975). For example, given the competing claims for scarce resources in local government organizations, we found structural features such as the level of professionalism and the

status of technological development to be much more important in the allocation of resources to technological innovations than the supportiveness of the chief executive or the receptivity of elected officials and department heads. Furthermore, we found that the impact of an actor's motivational orientation (favorability or support) on innovation is contingent upon the participant's organizational position rather than being uniform across participants. Thus, the results also suggest that it is useful to distinguish between an actor's organizational position and an actor's motivational orientation.

Although additional research is necessary before they might be generalized to other local-government technologies, these findings suggest a number of implications for the development of public policy. With regard to federal policy, officials must consider more explicitly how the dynamics of local-government resource allocation affects the success of particular intervention strategies. Since resource allocation to local departments for new technologies tends to follow prevailing power patterns, this factor must be considered in policy development. Federal agencies that offer technical assistance or training for local personnel to stimulate particular innovations might have to alter these incentives if their local counterparts face stiff competition from other local agencies in more advantageous political positions.

The results of this study suggest that capacity-building rather than technology-specific policies are more successful strategies for increasing local-government innovation. The net effect of federal policies supportive of specific innovations might be to encourage local government officials to act at cross-purposes with one another. The development by federal agencies of general approaches to increasing local government's capacity for change may be more fruitful. Of course, local governments could develop organizational policies to overcome problems associated with innovation-specific federal support. They might first identify technological development priorities that are based on the management and

operational needs of local departments. Local governments then would consider whether the incentives offered by federal agencies justified deviations from these priorities. Within this structure, additional policies for assuring effective resource allocation might be created. "Seed" money might be offered heads of departments in functional areas that are not federally supported to encourage entrepreneurial behavior within these agencies. Such monies might serve as a leveling mechanism to counteract the possible tendency of federal support to reinforce existing patterns of political power. Nevertheless, these policies could be costly and difficult to implement, considering their goals of altering previous patterns of resource allocation.

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