

# The Impact of Red Tape's Administrative Delay on Public Organizations' Interest in New Information Technologies

Sanjay K. Pandey and Stuart I. Bretschneider  
Syracuse University

## ABSTRACT

*Empirical evidence shows that public organizations have greater red-tape based administrative delay than do private organizations. If public administrators view red tape, at least partially, as a result of organizational communications, then it is likely that burdensome levels of red-tape based delay could motivate interest in new information technologies for facilitating organizational communications. In this article we use a national sample of state program agencies to provide an empirical test to determine whether public organizations see new information technologies as a means to mitigate red-tape based administrative delay. The results suggest that an organizational response depends upon both the level of delay and the level of importance information technologies already play within the agency. For example, new information technologies are not seen as instruments for cutting down the negative effects of burdensome delay, unless the organization is already using new information technologies to perform key organizational communications activities.*

A commonly cited difference between public and private organizations is that public organizations have more red tape. The empirical literature on public and private organizational differences provides support for the above proposition (Baldwin 1990; Bozeman, Reed, and Scott 1991; Bozeman and Bretschneider 1994; Bretschneider 1990; Bretschneider and Bozeman 1995; Rainey 1979 and 1983; Rainey, Pandey, and Bozeman 1995). Red tape is a broad construct and may be conceptualized in different ways. Goodsell (1985) calls it a classic *condensation* symbol. Kaufman (1977) and Goodsell (1985) point out that, among other things, the epithet red tape is used to denounce procedural delays, excessive reporting requirements, and depersonalization of clients. Bozeman (1993) views red tape as good rules gone bad with both objective and subjective impacts.

## *Symposium on Public Management Information Systems*

Bretschneider and Bozeman (1995) develop an operational measure of observable red tape in terms of bureaucratization and administrative delay (Bretschneider 1990; Bozeman et al. 1991; Bozeman and Bretschneider 1994). Prescriptions for dealing with red tape vary, from a smaller role for government to greater efficiency in the operation of public sector organizations.

One current prescriptive view surrounding red tape, best exemplified in the Paper Work Reduction Act, Grace Commission Report, and the National Performance Review, begins with the idea that, at least in part, red tape and its principal observable effect, administrative delay, are information/communications flow problems (Kennedy and Lee 1984; Head 1982). This view argues that if the communication process were streamlined, many of the negative effects of red tape would vanish. A corollary of this prescription is that information and communications technology can be used to contain red tape.

In this article we investigate whether public organizations see new computer technologies as tools to cut down red-tape induced administrative delay. In other words, do higher levels of red tape increase interest in new information technologies by public organizations? The first section presents a theoretically based discussion on the possible relation between red tape and new information technologies. The next section summarizes the data collection effort and the operationalization of the dependent and independent variables used in the study. The third section is an analysis, and the final section presents some implications and directions for future research.

## **RED TAPE AND NEW INFORMATION TECHNOLOGIES**

### **Historical Views of Red Tape**

The term *red* tape carries different meanings for different people. Paul Appleby quotes a public manager acquaintance: "Red tape is that part of my business you don't know anything about" (Goodsell 1985). Red tape can be functional and can serve useful purposes. Red tape, in the form of procedural safeguards and excessive filling and filing of forms, provides protection against arbitrary and capricious use of power, regulates aspects of business activities that citizens do not trust, and ensures fairness and equity in treatment of bureaucratic clients (Kaufman 1977; Goodsell 1985). However, these scholars do not make a case for red tape. Their point is that red tape, though undesirable, is inevitable if we want public organizations to be accountable to diverse and conflicting interests and at the same time to ensure fairness and equity in their treatment of clients. A more

## *Symposium on Public Management Information Systems*

desirable composite objective would be to serve the desired goals while at the same time minimizing red tape.

The term *red tape* expresses dissatisfaction. At a symbolic level red tape is an all encompassing symbol for the failures of government machinery (Goodsell 1985). The use of the term may express dissatisfaction with particular elements in the functioning of organizations—for example, procedural delays, excessive reporting requirements, depersonalization of clients, and excessive rule boundedness. Empirical studies on red tape typically have used one of the aforementioned effects of red tape to operationalize the concept of red tape—typically focusing on internal administrative effects—as opposed to its impact on service delivery. Buchanan (1975), Baldwin (1990), and Rainey et al. (1995) use measures that reflect managerial perceptions of the extent to which they are constrained by rules. Bretschneider (1990), Bozeman et al. (1991), and Bozeman and Bretschneider (1994) use a summative measure of time required for the organization to do certain core organizational tasks to measure red tape. Here it is necessary to go a step farther and note that the summative time measured may provide a measure of dimensions other than delays usually associated with red tape, namely, rule boundedness and reporting requirements. Finally, Bretschneider and Bozeman (1995) suggest that the administrative effects of rules can be decomposed into an *optimal* or *expected* level based on organizational and environmental factors and a residual component reflective of potential *pathological* red tape effect.

Clearly it is difficult to disentangle the complex nature of cause and effect when discussing red tape. At the risk of oversimplifying, we begin with the following assumptions: First, some of the empirically observable effects of red tape are related both to the design of and the technology for organizational communications, and second, empirically observable effects of red tape, such as procedural delay, are produced by numerous other factors as well. The first assumption provides a framework for developing a theory of administrative red tape in public organizations, while the second forces us to empirically control for alternative sources of explanation in any variable designed to measure effects of red tape.

### **Red Tape and Organizational Communications**

Organizations have been described and defined in many ways. One of the more insightful and useful ways to conceptualize organizations is to conceive of organizations as information-processing networks (Galbraith 1973 and 1977). To describe organizations as if they were information-processing networks is

### *Symposium on Public Management Information Systems*

not to depict the reality of organizational activities but rather to provide a useful means for understanding how organizations handle complexity (Galbraith 1973). This approach can be used to focus on organizational communications.

Organizations as information-processing networks may be conceptualized as a number of information-processing units (IPUs) that take differing amounts of time for processing that is connected in a certain temporal sequence, with each unit taking an information input from the preceding unit and giving an information input to the next unit. The information-processing units may be connected in different configurations:

- They may be connected in series. If there are  $n$  IPUs, only one of these processes information at a time and it passes the processed information to the next IPU down the line after a certain time delay.
- They may be connected in a parallel manner. More than one IPU may process the same information input simultaneously. The processed information is passed on to the next IPU in the network at different time intervals depending on the processing times and time delays associated with the individual IPUs. IPUs that process information in parallel may be assumed to be working in a cooperative fashion such that each IPU does a component of the task that contributes to the completion of the overall task.
- They may be connected in some combination of the two configurations described above.

The time it takes to do a task is the time it takes for the preliminary information input to go through this information-processing network. An organization may be performing a number of different tasks and the particular information-processing route taken to complete these tasks may vary. The model of organization as information-processing network that is presented above may be modified to include more details about a particular class of organizations. However our primary interest is in a general model to determine the time it takes for organizations to do their tasks.

Based on the information-processing network model of an organization that is described in the preceding paragraphs, the determinants of the total time it takes for an organization to do a task are the following:

### *Symposium on Public Management Information Systems*

- the number of IPU's involved;
- the processing times of the different IPU's involved;
- the particular network configuration of the IPU's involved; and
- the time it takes to transfer the processed information from one IPU to the next IPU in the network (transfer time or communication delay).

Excessive rule boundedness and reporting requirements will increase the total processing time by increasing the processing times at individual IPU's in the information-processing network and/or by increasing the number of IPU's involved in the information-processing network. An increase in the number of IPU's would result in increased processing time and increased transfer time. The total processing time (or the time used to do a task) thus has contributions from the red-tape dimensions of procedural delays, reporting requirements, and excessive rule boundedness in addition to the time that normally would be required to complete a task.

Thus red tape can be viewed, in part, as a result of problems in information processing and communications within an organization. It is important to note that the total time taken is not a measure of the effects of red tape by itself. As Bozeman (1993) and Bretschneider and Bozeman (1995) note, the total time measures the red tape in an implicit fashion. Different organizations would take different amounts of time to do certain organizational tasks because of differences in the information-processing network structure of organizations. Clearly size, organizational technology, and other factors affect the structure of the information-processing network. *In some sense, then, red tape's effect in this context is a residual concept, the excess amount of delay above and beyond that generated by other factors influencing such time delays.* In this study we will adopt the residual approach to defining red tape (Bretschneider and Bozeman 1995).

#### **Relating Red Tape to Interest in New Information Technologies**

The information processing capabilities of an organization are dependent on the four characteristics of an organization that were described previously: the number of IPU's, the processing time at each IPU, the particular network configuration of the IPU's, and the transfer time from one IPU to the next. New

### *Symposium on Public Management Information Systems*

information technologies with their superior information processing capabilities may be used to cut the processing time and thereby reduce one effect of red tape. If such a situation exists, one might anticipate that high levels of red-tape induced administrative delay would motivate interest in, and may even lead to adoption of, new information technologies. This leads us to the central hypothesis we wish to test empirically:

**Hypothesis 1:** The greater the red-tape induced administrative delay in an organization, the more interest the organization will display in new information technologies.

A certain component of the interest in new information technologies may be explained by greater negative effects associated with red tape in organizations. We would, however, need to take into account other contributors to interest in new technologies in order to control for possible confounding effects. While it may not be possible to come up with an exhaustive list of independent and interacting effects that would explain all the variation in interest in new information technologies, it is possible to specify a priori a model that includes elements that could be alternative explanations for interest in new information technologies. The model we use to explain interest in new information technologies may be represented as:

$$\begin{aligned} \text{Interest in new information technologies} = \\ F(\text{red tape, organizational characteristics,} \\ \text{environmental characteristics, interaction effects}) \quad (1) \end{aligned}$$

The organizational characteristics chosen as controls are size of the organization, reliance of the organization on new information technologies to perform key organizational tasks, and function performed by the organization. The environmental characteristic chosen as a control is the intensity of the environmental demands for information sharing. Interest in new technologies will have independent contributions from these variables and contributions that result from interactions between them. For example, one may expect that an organization with high red tape and high reliance on new information technologies will be likely to link red tape as a problem with interest in new information technologies as a possible solution. A larger organization with a high degree of reliance on new information technologies may be expected to display greater interest in new information technologies than will a smaller one, simply because the larger organization has access to greater slack resources.

### *Symposium on Public Management Information Systems*

The supplemental hypotheses relating these control variables to the dependent variable—interest in new information technologies—are listed below followed by some reasons one might expect the hypothesized relationships:

**Hypothesis 2:** Larger organizations (i.e., greater size) would display greater interest in new information technologies.

**Hypothesis 3:** Organizations that rely more on new information technologies for performance of key organizational tasks would display greater interest in new information technologies.

**Hypothesis 4:** Organizations that face greater environmental demand for information sharing would be more interested in new information technologies.

Size affects organizational behavior significantly. A greater size usually means greater slack is available in terms of manpower and monetary resources. This slack may be used to explore new information technologies and their possible usefulness to the focal organization. Also, larger organizations often have more complex structures and therefore probably have greater needs for information processing and communication. This could lead to greater interest in new information technologies.

Reliance on new information technologies to do certain key tasks grows out of the perceived and real usefulness of those technologies in the performance of those particular kinds of tasks. Old products and applications become outmoded and new ones are introduced at a very high rate. Shopping for new information technologies requires an understanding of the organizational needs and of what is out there in the marketplace. Organizations that are dependent on new information technologies may therefore be expected to invest resources to keep current with these new technologies independent of red tape effects.

An organization depends on its environment to import the resources to do its work, and its output is for units in the environment. The pressures that originate in the environment from the resource providers, clients, and other stakeholders greatly influence an organization. Organizations put forth considerable effort and resources to keep the stakeholders happy. It is expected therefore that organizations that share information extensively with various environmental actors would display greater interest in new information technologies as a means to

## Symposium on Public Management Information Systems

more efficiently share information. We call this characteristic of the organization-environment relation *information intensity*.

The function performed by an organization is included as a control to reflect the effect that function may have on the information network structure of an organization. Organizations that produce similar outputs (e.g., education or public safety) may be expected to have similar structures and possibly to employ similar technology. It is important to separate the effects particular to a class of organizations in order to make generalizations across different types of organizations.

## DATA COLLECTION AND MEASUREMENTS

### Data Collection

The sample of public organizations, made up exclusively of state government program agencies (e.g., division of secondary education) was obtained through a national survey that was conducted in association with the National Association of State Information Systems, Inc. (NASIS).<sup>1</sup> Surveys were sent to the director of each program agency. As is true for any mail survey of this sort, it is impossible to guarantee that the instrument was completed by the targeted person or that the responses obtained are the only view of the organization. Given that general limitation, we view respondents as *key informants* and hence argue that the unit of analysis is the program agency.

<sup>1</sup>Researchers used various published directories to obtain a sample frame of 2,988 program managers and developed and pretested survey instruments on a sample of one hundred managers. Once the results of the pretest were incorporated into the survey instruments, the researchers sent alert letters to the remaining names in the sample frame. This was followed a week later by the first wave of the survey, which included a reminder letter and a survey. All non-respondents were sent a copy of the survey and a reminder letter three weeks after the first wave was sent out. This was the final wave mailing.

The survey director's office received numerous phone calls about the survey. In all cases the phone calls were routed to the survey director to ensure consistency in responses. A frequently asked question was whether there was a deadline for returning the survey. The survey director encouraged the callers to respond and told them there was no set deadline.

A total of 1637 responses was received, a response rate of 54.8 percent. Several tests were performed for selection bias. The geographic distribution of the pool of respondents differed slightly from that of the sample frame. This, however, should not be a problem, because the variables used to test the hypotheses should be independent of geographic distribution.

The hypotheses proposed in the previous section must be tested in the context of an empirically estimable model. As a starting point, consider the following linear multivariate regression, model one, which considers all the factors listed in equation (1) but without any interactions among the independent variables:

$$\begin{aligned} \text{Interest (in new information technologies)} = & \beta_0 + \\ & \beta_1 * \text{Size} + \beta_2 * \text{Reliance on computing (internal)} + \\ & \beta_3 * \text{Reliance on computing (external)} + \\ & \beta_4 * \text{Information intensity} + \beta_5 * \text{Function} + \\ & \beta_6 * \text{Red tape} + \text{error} \end{aligned} \quad (2)$$

### Measurement

The following operational measures were used for each of the variables listed in equation (2).

**Interest.** The respondents were asked to indicate the importance for the organization during the next three years of various types of information technologies, on a five-point Likert scale

## *Symposium on Public Management Information Systems*

with 1 indicating very important and 5 indicating not at all important. Some technologies the respondents rated were new input technologies like optical card readers, new communication services, new configuration of information systems, new end-user technologies, and new output devices. The scores of interest in the eight subgroups of information technologies were added to obtain a measure of interest in new information technologies. The lower this sum of scores, the greater the interest an organization has in new information technologies.

**Size.** Size was measured as the logarithm of the total number of full-time equivalent employees. Logarithm of size, rather than size, is used to account for the declining influence of size as size increases.

**Reliance on Computing.** Two Likert scale variables were used to measure this aspect of an organization's activities, with 1 indicating very important and 5 indicating not at all important. Respondents were asked to indicate the importance of information technologies for carrying out an agency's program operations for the following organizational activities: (i) internal communications, and (ii) external communications (e.g., responding to evaluation, audit, and oversight).

**Information Intensity.** Multiple five-point Likert scales were used, with 1 indicating very often and 5 indicating never. The respondents were asked to indicate the extent to which their agency shares with the following groups information that relates to the programmatic activities of the agency: state legislature, other state agencies, local governments, media, federal government, private business, and clients. These scores were added to get a measure of information intensity. The lower this sum of scores, the higher the information intensity of the agency.

**Function.** A series of binary variables was used to indicate different functional groupings. Eight qualitatively distinct groups were formed: commerce and regulation; education; employment and labor; environment and natural resources; health; human and social services; safety and criminal justice; and transportation.

**Red Tape.** As was stated earlier, we measure red tape as a residual concept where total procedural delay is simply a starting point. The total number of weeks spent obtaining approval to carry out certain key organizational tasks was used as an initial measurement. The amount of time spent on the following tasks was used in this summative measure—creating a new civil service position; purchasing equipment that cost less than \$1,000; purchasing equipment that cost more than \$1,000; contracting for

services; changing a major policy; changing a major administrative policy; and changing a major program policy. The activities above are common to and essential for effective program operation.

Next, recognizing that a portion of the total delay is simply due to organizational structure and function as noted earlier, the total time delay measure was modeled in terms of the size, function, and location of the organization. A standard ordinary least squares (OLS) regression was used to calculate the residuals from this model. These residuals represent procedural delay that is not explained by organizational size, function, or regional location.<sup>2</sup> Consequently, these values represent a residual approach to defining the portion of time delay associated with red tape. Exhibit 1 summarizes the results of the regression, including the distribution of the residuals, our measure of red-tape induced procedural delay.

<sup>2</sup>A variety of models was considered and tested before this particular approach was chosen. The results that follow were quite robust with respect to different specifications of the core model for administrative delay.

<sup>3</sup>Only 1,038 cases contained consistent information on all variables. With almost six hundred cases deleted due to missing observations, a potential problem of selection bias must be considered. Examination of the data revealed that size was the only major distinction between the cases that were included in the estimation and those that were excluded. On average, larger organizations were represented in the data that was used for estimation than were represented in the entire sample. Bias correction was attempted using the Heckman procedure (Judge et al. 1985). Unfortunately, it was impossible to obtain a good model to predict selection. The results suggest that the effect of selection does not generate bias when relying on the subsample of cases.

<sup>4</sup>An analysis of the condition index for the different models, which measures the presence of multicollinearity among the independent variables, was carried out (Belsley, Kuh, and Welsch 1980). The analysis indicated that the third model had a high degree of multicollinearity. The major effect of this technical problem is that, though the main effect of red tape remains negative in the third model, it potentially is identified incorrectly as not being a significant contributor to interest in new technologies. The addition of red tape interacted with organizational size, and information intensity obscures this main effect and adds nothing to the overall explanation of interest in new information technologies.

## ANALYSIS AND DISCUSSION

Model 1 was estimated using OLS.<sup>3</sup> Two alternative empirical models also were considered, which made use of the same variables but considered the possibility that red tape interacts with other organizational variables in effecting interest in new information technologies. Exhibit 2 presents the results of estimating all three alternative models. The first model is based solely on the specification provided in (2) above.

Of the three alternatives presented, the second model appears to provide the most appropriate form for the relationship. Interacting red tape with the extent to which the organization is currently committed to using computers for internal and external communications reveals a statistically significant role for red tape that was not present without the interactions. The third model goes too far in interacting red tape, generating so much intercorrelation among the independent variables that it becomes impossible to sort out true statistical significance (Judge et al. 1985, 896-930).<sup>4</sup>

When we focus our attention on the results for model 2, we find that each of the ancillary hypotheses (H2, H3, H4) is supported. Since the measurement scale for interest in new technologies indicates higher interest at lower numeric value (e.g., 1 is the highest level of interest), the negative sign on the partial regression coefficient for the size variables indicates that the larger the organization the greater the interest in new information technologies. The three measurement scales for reliance on computing for internal and external communications and information

*Symposium on Public Management Information Systems*

**Exhibit 1  
Model Used to Generate the Red-Tape Measure\***

Variable	Estimate	P-Value
<b>Dependent Variable: Summative Measure of Procedural Delays</b>		
Intercept	101.6908	0.0001
Size**	0.0011	0.0321
<b>Function (dummy variables)</b>		
Commerce	-3.7943	0.6014
Education	-5.1085	0.6505
Employment	-11.4881	0.1697
Environment	5.8583	0.3671
Health	-5.8234	0.4815
Human services	-7.5999	0.2632
Safety	-17.9352	0.0082
Transportation	.	.
<b>Region (dummy variables)</b>		
South	-27.7688	0.0001
Midwest	-25.9225	0.0001
West	-22.3563	0.0001
Others***	-32.3129	0.0001
Northeast	.	.
<b>Function</b>		
F-statistic	2.81	0.0067
<b>Region</b>		
F-statistic	7.74	0.0001
<b>Summary Statistics</b>		
Sample size	1038	
R-square	0.0502	
F-statistic	4.5268	
Standard error		57.35
<b>Distribution of Residuals</b>		
Maximum	640	
95th %	100	
90th %	62	*The residual from this regression was used as the red-tape measure.
75th %	22	**Number of full time equivalent employees.
Median	-13	***Include U.S. territories (e.g., Puerto Rico) and Washington, D.C.
25th %	-36	Note that negative values indicate organizations that have less procedural delay than the average organization of the same size, function, and location.
10th %	-50	
5th %	-59	
Minimum	-91	
Mean	0.0	
Std. deviation	57.0	

*Symposium on Public Management Information Systems*

**Exhibit 2**

**Estimation Results for Three Alternative Models of Effect of Red Tape on Interest in New Information Technologies**

Variable	Model 1		Model 2		Model 3	
	Estimate	P-Value	Estimate	P-Value	Estimate	P-Value
<b>Dependent Variable: Interest in New Information Technologies</b>						
Intercept	10.221	0.0001	10.440	0.0001	10.464	0.0001
Red Tape	0.001	0.7854	-0.015	0.0425	-0.010	0.4609
Size*	-0.451	0.0001	-0.460	0.0001	-0.458	0.0001
Internal Communications	0.948	0.0001	0.937	0.0001	0.943	0.0001
External Communications	0.967	0.0001	0.977	0.0001	0.985	0.0001
Intensity	0.171	0.0001	0.164	0.0001	0.160	0.0001
<b>Interaction Terms (red tape with)</b>						
Internal Communications	.	.	0.0060	0.0024	0.0067	0.0013
External Communications	.	.	0.0002	0.9153	0.0006	0.7673
Size	.	.	.	.	0.0007	0.5998
Intensity	.	.	.	.	-0.0006	0.3393
<b>Function (dummy variables)</b>						
Commerce	0.251	0.6498	0.227	0.6805	0.215	0.6972
Education	-0.281	0.7393	-0.355	0.6736	-0.383	0.6498
Employment	1.920	0.0024	1.944	0.0020	1.960	0.0019
Environment	1.053	0.0306	1.009	0.0380	1.007	0.0385
Health	1.915	0.0023	1.874	0.0028	1.861	0.0030
Human services	1.411	0.0055	1.355	0.0076	1.352	0.0077
Safety	-0.250	0.6206	-0.279	0.5796	-0.272	0.5906
Transportation	.	.	.	.	.	.
<b>Function</b>						
F-statistic	4.81	0.0001	4.81	0.0001	4.82	0.0001
<b>Summary Statistics</b>						
Sample size	1038		1038		1038	
R-square	0.2405		0.2473		0.2482	
Adjusted R-square	0.2316		0.2456		0.2364	
F-statistic	27.04		24.01		21.07	
Standard error	4.277		4.262		4.264	

\*Logarithm of number of full-time equivalent employees.

intensity also represent higher levels by lower numeric values. Therefore, the positive partial regression coefficients associated with these variables suggest that increased importance of computing in either internal or external communications increases interest in new information technologies. Similarly, as the information intensity of the organization increases so does interest in new information technologies. The control variables used to differentiate function of the organization are important, suggesting that

*Symposium on Public Management Information Systems*

different organizational task environments encourage different levels of interest in new information technologies. It is reasonable to speculate that this might be a result of different levels of core technology, professionalism, and so forth.

The effect of red tape is more difficult to discern, given the interaction terms. Exhibit 3 attempts to describe these effects in terms of the marginal contribution of a one unit increase in red tape on interest, as well as red tape's absolute effect at low, medium, and high levels. To calculate the marginal effects we look at the scale for measuring importance of computing for internal communications. This scale runs from 1, which indicates very important, to 5, which indicates not important at all. Substituting the extreme values of this scale into the equation for the marginal effects generates numbers running from -0.009 through +0.0016. This means that when importance of computing is at its highest level, a one unit increase (e.g., one week's additional

**Exhibit 3**  
**Effect of Differing Levels of Red Tape and the Importance of Data Processing in Internal Communications on Interest in New Information Technologies (based on model 2)**

*Marginal* effect of red tape on interest in new information technologies:

$$-0.0145 + 0.0060 * \text{internal communications}$$

*Total* effect of red tape on interest in new information technologies for specific levels of red tape and for importance of data processing in internal communications:

Total Effect on Interest in New Information Technologies\*

Level of Importance  
of Data Processing in  
Internal Communication

Very Important		0.43	0.11	-0.53
Neutral		-0.17	-0.05	0.22
Not Important		-0.79	-0.21	0.97
		+-----		
		Low	Medium	High
		(10th)	(50th)	(90th)
		Levels of Red Tape Variable		

\*A negative number in this exhibit corresponds to a gain in interest in new information technologies.

### *Symposium on Public Management Information Systems*

delay) in red tape leads to a 0.009 increase in interest for new information technologies. At the other extreme, when importance of computing is at its lowest value, a one unit increase in red tape leads to a 0.016 unit decrease in interest in new information technology.

To form a more complete picture of the effect of red tape, we compute its effect on interest in new information technologies for a range of its values. The second section of exhibit 3 considers three situations: when red tape is low (i.e., the 10th percentile case for the red-tape variable), when red tape is medium (i.e., the 50th percentile or median case), and when red tape is high (i.e., the 90th percentile case). Since the red-tape variable is defined as a regression residual, the variable contains both negative and positive values. The interpretation of a negative measurement for red tape is that this organization's unexplained level of procedural delay is less than that predicted by its structure. In other words, some organizations have streamlined red-tape effects. The low and medium levels of red tape are actually negative values. Thus when calculating absolute effects presented in exhibit 3 four quadrants emerge, best exemplified by the four corner values.

Exhibit 4 attempts to summarize and interpret the values presented in exhibit 3. This exhibit considers two dimensions of the importance of computing to internal communications and levels of red tape. Given that we have negative and positive values for red tape, we characterize these two extreme cases as either *streamlined* or *burdensome* along the red-tape dimension. When red tape is streamlined and the organization is already highly committed to information technology for internal communications, the organization tends to view red tape as not amenable to information technology. In fact the two tend to be independent of each other. Familiarity with information technology in and of itself does not lead to information technology based solutions for red tape. Only when the levels of red tape are burdensome and the organization is committed to information technology for internal communications does the model suggest an interest in seeking information technology solutions to red tape.

Why then would organizations with little exposure to information technology and streamlined red-tape system be motivated to consider new information technologies? This could be due simply to the lack of prior exposure to information technologies. Lack of experience might make these organizations less able to critically connect an organizational problem with an appropriate solution strategy. On the other hand if burdensome levels of red

**Exhibit 4**

**How Importance of Information Technology for Internal Communications Interacts with Red Tape to Affect Interest in New Information Technologies**

Importance of Computer  
Technology for Internal  
Communications

High  n = 549 (53%)	Negative Effect  I  View red tape independent of new information technology n = 321	Positive Effect  II  View red tape as ameliorated by information technology n = 228
	Positive Effect  III  View red tape as ameliorated by new information technology n = 310	Negative Effect  IV  View red tape as barrier to new information technology n = 179
Low  n = 489 (47%)	Streamlined n = 631 (61%)	Burdensome n = 407 (39%)
Levels of Red Tape		

tape exist they are likely to become constraints to action, thereby closing down links to solutions. The last cell of this typology reflects the class of organization that not only is unfamiliar with information technology but faces high levels of red-tape induced procedural delay. It is interesting to note that in this model the diagonals generate like responses. High commitment and streamlined red tape elicit the same response as low commitment and high levels of red tape, while high commitment and burdensome red tape engender the same response as low commitment and lower than normal red tape.

One final result worth noting is that red tape's influence is tied to organizational use of information technologies for internal,

but not external, communications. One reason for this could be that the red-tape variable in the study focuses entirely on internal managerial processes. Delays often are related to reviews carried out beyond the immediate organization. Electronic mail and file transfer systems used by the organizations could speed up external reviews, since such systems might be in use by the reviewer organization as well.

## DISCUSSION AND CONCLUSIONS

This article has made a contribution to the uncovering and elucidating of the complex nature of the relationship between red tape and the efforts to seek amelioration of the same by technological means. Red tape is one of the concepts most commonly invoked by communities while they take a few tentative thrusts and then deliver the coup de grace—as they adjudicate the perceived or real inefficiency of a public organization. However, measuring red tape has not been very easy. Bozeman et al. (1991) and Bozeman (1993) talk of the difficulty of measuring red tape and the conflation of the red tape concept with structural characteristics of organizations. In some previous studies, red tape was measured mostly by perceptual indicators (Buchanan 1975; Baldwin 1990; Rainey et al. 1995). Questions about constraint the employees might have felt while they carried out certain activities with Likert-scale responses were used to measure red tape.<sup>5</sup> Using a theoretically based argument from Bretschneider and Bozeman (1995) for the use of a residual measure of procedural delay as red tape, this study develops a methodology for distinguishing red-tape induced delays from ordinary delays. This methodology can be extended by producing better specifications for generating the residual measure.

We departed from a common prescriptive orientation that assumes burdensome levels of red tape and proceeds to dispense universal cures. If red tape is an affliction, it affects different organizations to differing degrees, and this is likely to produce differing dynamics and outcomes. This study, based on a large nationwide survey, has developed a typology of organizations (presented in exhibit 4). The previous section on analysis and discussion presents possible explanations for the relationships that have been uncovered. These results have important implications for further research. Prescriptions for a single representative organization are likely to be error prone. An approach that utilizes the distinctions that are developed and illustrated in exhibit 4 would provide a better starting point. Comparative research that compares organizations in different cells may provide valuable insights.

<sup>5</sup>A few notable problems associated with the use of perceptual measures on the constraints faced by employees are:

- The measures may depend on the level of the employee in the organizational hierarchy.
- Rather than measure red tape and its manifestations, the measures indirectly capture the structural characteristics that create the conditions that generate red tape.
- Comparability of perceptual scores from differing task environments is prone to error arising from differing cognitive makeup of the employees.

## Symposium on Public Management Information Systems

It is important to acknowledge that, as noted earlier, red tape is not entirely dysfunctional in public organizations (Goodsell 1985; Kaufman 1977). The incentives to reduce red tape may not be as strong as the incentives to achieve the purposes served by the existence of red tape. From this perspective red tape is not entirely amenable to a technological solution. This perspective is reasonable in light of the special constraints that public organizations face. (See Rainey, Backoff, and Levine 1976 for an overview.)

The negative effects of red tape in the form of procedural delay can be at best partially affected by adoption of new information and communication technologies. Using the information processing framework, technological change can speed communication across processors but will have little or no effect on configuration or number of processors. Both the configuration and the number of processors, in our view, are determined largely by the political environment.

## REFERENCES

- Baldwin, J.N.  
1990 "Perceptions of Public versus Private Sector Personnel and Informal Red Tape: Their Impact on Motivation." *American Review of Public Administration* 20:7-28.
- Belsley, D.; Kuh, E.; and Welsch, R.  
1980 *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: Wiley.
- Bozeman, Barry.  
1993 "A Theory of Government Red Tape." *Journal of Public Administration Research and Theory* 3:273-303.
- Bozeman, Barry, and Bretschneider, Stuart.  
1994 "The 'Publicness Puzzle' in Organization Theory: A Test of Alternative Explanation of Differences between Public and Private Organizations." *Journal of Public Administration Research and Theory* 4:197-223.
- Bozeman, Barry, and Crow, Michael.  
1991 "Red Tape and Technology Transfer Success in Government Laboratories." *Journal of Technology Transfer* 16:(spring):29-37.
- Bozeman, Barry; Reed, Pamela; and Scott, Patrick.  
1991 "'Red Tape' and Task Delays in Public and Private Organizations." *Administration and Society* 24:290-322.
- Bretschneider, Stuart.  
1990 "Management Information Systems in Public and Private Organizations: An Empirical Test." *Public Administration Review* 50:536-45.
- Bretschneider, Stuart, and Bozeman, Barry.  
1995 "Understanding Red Tape and Bureaucratic Delay." In A. Halachmi and G. Bouckaert, eds. *The Enduring Challenges in Public Management*. San Francisco: Jossey-Bass.
- Buchanan, B.  
1975 "Red-tape and the Service Ethic: Some Unexpected Differences between Public and Private Managers." *Administration and Society*. 6:423-44.
- Caudle, Sharon.  
1990 "Managing Information Resources in State Government." *Public Administration Review* 50:515-25.
- Galbraith, J.  
1973 *Designing Complex Organizations*. Reading, Mass.: Addison-Wesley.  
1977 *Organization Design*. Reading, Mass.: Addison-Wesley.
- Goodsell, C.T.  
1985 *The Case for Bureaucracy: A Public Administration Polemic*, 2d ed. Chatham, N.J.: Chatham House.
- Head, R.V.  
1982 *Federal Information Systems Management*. Washington, D.C.: Brookings.

### *Symposium on Public Management Information Systems*

- Judge, G.G.; Griffiths, W.E.; Hill, R.C.; Lutkepohl, H.; and Lee, T.  
1985 *The Theory and Practice of Econometrics*, 2d ed. New York: Wiley.
- Kaufman, H.  
1977 *Red Tape: Its Origins, Uses and Abuses*. Washington, D.C.: Brookings.
- Kennedy, W.R., and Lee, R.W.  
1984 *A Taxpayer Survey of the Grace Commission Report*. Ottawa, Ill.: Jameson Books.
- Kraemer, K.L., and King, J.L.  
1986 "Computing and Public Organizations." *Public Administration Review* 46:488-96.
- Northrop, A.; Kraemer, K.L.; Dunkle, D.; and King, J.L.  
1990 "Payoffs from Computerization: Lessons Over Time." *Public Administration Review* 50:505-14.
- Ostrowski, J.W.; Gardner, E.P.; and Motawi, M.H.  
1986 "Microcomputers in Public Finance Organizations: A Survey of Uses and Trends." *Government Finance Review* 2:23-29.
- Rainey, H.G.  
1979 "Perceptions of Incentives in Business and Government: Implications for Civil Service Reform." *Public Administration Review* 39:440-48.  
1983 "Public Agencies and Private Firms: Incentives, Structures, Goals and Individual Roles." *Administration and Society* 15: 207-42.
- Rainey, H.G.; Backoff, R.W.; and Levine, C.H.  
1976 "Comparing Public and Private Organizations." *Public Administration Review* 36:233-44.
- Rainey, H.G.; Pandey, Sanjay; and Bozeman, Barry.  
1995 "Public and Private Managers' Perceptions of Red Tape." *Public Administration Review* 55:567-74.
- Schumacher, B.G.  
1967 *Computer Dynamics in Public Administration*. Washington, D.C.: Spartan Books.
- U.S. Congress.  
1984 *Grace Commission Recommendations: Hearing before the Committee on Finance*, 98th Congress, 2d sess., Feb. 8. Washington, D.C.: Government Printing Office.