Public Management Information Systems: Theory and Prescription

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One reflection of the enormous increase in interest in management information systems (MIS) is the rapid growth of research, theory, and prescription. But available knowledge of MIS is not of equal service to all managers. Managers working in the public sector must exercise particular caution as they seek to draw lessons from MIS literature. The vast majority of MIS knowledge, both formal and "know how," has been developed from private-sector data sites for application in private sector contexts. Prescriptions developed for the private-sector or for "generic" management may be valid for the public sector context. The problem is in determining which findings and prescriptions are applicable to public management and which are not.

While MIS theory and research has grown by leaps and bounds, little research and virtually no theory has been published on public management information systems (PMIS). The purposes of this paper are to provide an integrating theoretical framework for PMIS which focuses on the differences between public and private sector environments and to use the framework to develop prescriptive propositions for PMIS. Before presenting the PMIS framework, existing frameworks for MIS research and theory are briefly reviewed.

Conceptual Frameworks for MIS

Over the last decade several studies have reviewed the MIS literature and presented frameworks for research. The model developed by Ives, Hamilton, and Davis provides an integrated approach for conceptualizing MIS and categorizing MIS research.

Figure 1 depicts this model, in which three classes of variables are identified: environmental variables that define resources and constraints on MIS, information system variables that characterize the MIS, and process variables that measure performance of the MIS within the organization.

The model presented by Ives and his associates is not, at least in one sense, representative of the MIS literature. Whereas the model shows some concern with environmental context, the MIS literature typically ignores environmental variables and focuses almost exclusively on intraorganizational or individual behavior. One major focus of MIS research has been on organizational context, relating the characteristics of the organization to performance of the MIS. To demonstrate the intraorganizational emphasis, Ives, Hamilton, and Davies examined 331 MIS dissertations and found that only 13, less than 4 percent, considered external environment.

In one of the few comprehensive treatments of environmental factors, Mansour and Watson conceptualized external environment as a multidimensional scale reflecting level of competition, variety of services and products, frequency of new ventures, amount of customer requirements and amount of external regulation. The scale proved a strong predictor of MIS performance. Other variables also significantly correlated with MIS performance. The same model was applied to a sample of 39 public organizations, but with much less explanatory success. Mansour and Watson concluded that "Government organizations function in an environment that is much different from that faced by private business organizations."

In addition to the neglect of environmental variables, a second problem with the current model for MIS...
FIGURE 1

Environmental Characteristics (Constraints and Resources)

External Organizational Users
Operations Development

Development Operations Use

Content Time Form

Information System Characteristics

Process Variables (Performance Measures)


research is its failure to link or sometimes even relate levels of analysis. In most of the work reviewed above, the level of analysis is that of the organization. Given that focus, it should be pointed out that most of this research relies heavily on questionnaires and structured interviews of multiple actors within each organization. The data are then aggregated to characterize the MIS and the organization.7

At the individual level of analysis, MIS research follows two patterns. The dominant one focuses on the effect of MIS on decision making and relies heavily on small group laboratory studies.8 The decision context usually reflects a business organization, such as a manufacturing firm, where the decision deals with inventory management or accounting and financial decision making.9

Cognitive process variables are often considered along with the MIS variables to explain decision outcomes. Huber8 argues that the cognitive process research suffers from too many different measurement schemes and validity problems to be a useful focus for MIS theory.

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The other stream of research at the individual level relies heavily on survey data, though experiments are also used. The principal proposition is that user involvement with MIS design and operation improves MIS performance. A recent survey by Ives and Olson reviews much of this work and finds mixed results. Of 22 studies reviewed, 8 found positive relationships between user involvement and various measures of MIS performance, 7 had mixed results, and 7 found negative or nonsignificant results. Ives and Olson argued that few of the studies provided sufficient rigor in measurement or design to warrant much confidence in the results. Again, at this level of research in MIS, little concern for external environment has been demonstrated.

A Framework for PMIS Research

Existing conceptual frameworks were not devised to facilitate research on public sector implications of MIS. Figure 2 presents a revised framework, one pertinent to previous work but giving greater emphasis to social and environmental context.

Organizational context includes the set of variables normally identified with this area, such as size, struc-
ture, time frame, organizational resources, and organizational maturity. The individual context reflects characteristics of individual actors within an organization, including cognitive style, level of satisfaction with MIS and other such personal and demographic attributes.

Studies at different levels of analysis naturally employ somewhat different effectiveness measures. Illustrative measures for the organizational context include aggregate use of MIS, diversity in applications, and level of use within the organization. Under individual attributes, effectiveness variables include cost, timeliness, and profitability. The PMIS framework differs from conventional MIS frameworks by emphasizing environmental factors rather than internal characteristics of the organization. It is, of course, no surprise that organizations, public and private, are affected by their external environments. The PMIS framework seeks to go beyond this perhaps trivial observation of environmental significance to distinguish between "proximate" and "distal" environments and to suggest the rudimentary mechanics by which environmental differences affect managerial behavior. This is accomplished by applying existing theories of public-private management differences to the particular case of information management.

Four Models of Publicness

In this section four models of "publicness" are presented which are useful for developing a prescriptive theory of PMIS. Despite the fact that a great many propositions have been offered about differences between public and private organizations, it is nonetheless possible to capture most of these propositions in just four "models of publicness": (1) Economic Authority; (2) Political Authority; (3) Personnel and Personnel Systems; and (4) Work Context.

The first two models may be viewed as aspects of the "distal" environment of the organization in that they include factors that are broad-based and sweeping in their effects. They are primary causes. The second two models are "proximate" in the sense that the factors are less elemental, more particular to certain types of organizations, and, importantly, heavily influenced by factors in the distal environment. Most of the components of the proximate models are secondary causes.

Economic Authority Model

According to the economic authority model, differences in public and private organizations flow from the economic character of the respective sectors and the goods and services they deliver. The chief argument of the market failure approach is that the market is generally the most efficient device for allocation of goods and services and that government should intervene only in cases of market failure. Market failure can result from several factors. It can result when information available to economic actors is insufficient or distorted. Sometimes a deficit occurs because of the public goods characteristics of information. Substantial demand for information may exist but, because of difficulties associated with exclusion, no effective market may exist for economically efficient purchase of information. Sometimes breakdowns in competition can lead to market failure, especially in the case of monopolies. In some instances, the market can establish costs and facilitate exchange, but transactions costs are prohibitively expensive. A special market failure problem relates to public goods and the externalities that result from the public character of goods and services. According to Herber, the primary characteristic of public goods is that they are jointly consumed and thus indivisible in the sense that some or all of their benefits cannot be priced in the market. In such cases, the market is not efficient as an allocator of goods and services. A related consideration is the presence of externalities. Externalities arise when some value (positive or negative) of a good or service is not reflected in its price or resources used.

In addition to familiar public goods and market failure criteria for distinguishing public and private sector organizations and their activities, economists have developed arguments pertaining to property rights and ownership. According to property rights theorists, the most important distinction between private and government organizations lies in the inability to transfer ownership in government organizations from one individual to another. Since no shares of government stock exist, the individual cannot alter his "portfolio" of investments in government programs and cannot exchange ownership rights. It is argued that the ability to exchange ownership is related to economic efficiency. Economists view ownership as a productive input that functions to bear risk and organize managerial activity. In public organizations, capital risk is diffused to such a degree that it virtually ceases to exist. Furthermore, the distribution of managerial ability among organizations has little correspondence to its value as a productive input.

The absence in government of a strong link between work input and reward allegedly leads to lower productivity. Additional inefficiency is related to the fact that bureaucratic regulations and monitoring mechanisms are promulgated as inadequate but costly substitutes for valuations and reward systems based on property rights. In private firms, entrepreneurs and wealth-sharing managers exert pressure for a combination of economic input to maximize productivity. In government, managerial activities center around more diverse rationales, particularly side-payments related to political power, budget expansion, and increments in personnel.

The Political Authority Model

In the firm, authority rests on economic incentives. In public organizations the grant of authority is quite different in nature. While political authority is ultimately reflected in fundamental values and the psychological commitments of individuals to the government,
macy of political authority is formally embodied in a legal and constitutional structure. The constitutional principle of separation of powers among the three branches of government is especially significant in the United States. Public organizations are directed by executive superiors, dependent on legislators for their resources, and are subject to rules, interpretations, and injunctions of the judicial branch. When one also considers the external control of procurement and facilities management, personnel procedures, and reorganization of the fragmentation of authority imposed by the structure of federalism, it becomes clear that the political authority of public organizations is exercised in a much different structural framework than the economic authority of a private firm.

Equally important to the fragmentation of political authority is its interdependence. The private firm is, ultimately, driven by internal goals related to profit and stable growth. The goals of the public organization are, at least to some extent, set externally and transcend the self-interests of the single organization and its programs. Whereas competition among private firms is a social virtue, competition among public agencies is generally not.30 When public agencies work at crosspurposes they are viewed as ineffective.

Another feature of the legal and constitutional structure which separates public from private organizations is mandated representation and the electoral process. While private organizations are enjoined from discriminatory practices in many instances, they are not required to be representative, nor does the authority of private managers flow ultimately from elected public officials. There is no private sector counterpart to political control of public organizations.

Finally, the focus on individual rights is a sharp distinction between public and private sector. The Bill of Rights is the most obvious legal guarantor of individual rights, but individual statutes and personnel procedures also emphasize the rights of the individual. These rights are manifested in the elaborate due process guarantees and appeals procedures of the federal civil service system. The focus on individual rights also extends to the clients of the public organization who are protected by the courts, appeals procedures, and legislated eligibility.

Even if more ephemeral, the social psychological bases of political authority are sometimes just as important as the legal bases. Behaviors in public and private organizations differ in many cases because the individual citizens committed to the legitimacy of government have different expectations for public organizations than for private organizations. Public organizations and public employees are expected to work in the public interest.

**Work Context Model**

The Work Context Model focuses less on the broadscale structural determinants of public-private differences (the distal environment) than on the proximate environment. Whereas the other two models are anchored in empirical research as well as long-standing theoretical traditions, the Work Context Model is chiefly derived from the reported observations of high-level government and business officials, especially “sector spanners” who have had experience in both public and private organizations.31 The Work Context Model centers on observed differences in public and private sector work, usually focusing on high-level managerial positions (where differences may be assumed to be greatest). One commonly noted distinctive feature of the public sector executive’s work context relates to time frame and pace of work.32

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**An additional concern in evaluating PMIS at the environmental level is the degree to which the PMIS responds to external requests for data.**

Business executives also work at a frantic pace, but the two “pace accelerators” are more commonly experienced by public managers. First, the public manager is more often subject to scrutiny by the mass media and from a wide array of interest groups which have a stake in the outcomes of policy decisions. When actions are scrutinized by millions, there is usually less opportunity for reflection, measured action, or reversals of policy.

Probably the most important difference in the time frame of public and private sector managers is related to the political cycles of government. The appropriations process generally operates on an annual basis; Congress turns over every two years, and the presidency is subject to change every four years. Constant pressure exists to achieve quick results—results that can help the agency receive a larger share in the next round of appropriations; results that can help in reelection.

Another attribute of the public sector work context is that it is crisis driven. Sometimes perceptions of crisis are just as important as reality. Indeed, policy makers often seize upon crises or even manufacture them to make their cause appear more urgent. The result of the real and manufactured crises serving as catalysts (sometimes the only effective catalysts) for moving policy on the public agenda is that policy is less coordinated.

Finally, work in the public sector is more subject to public scrutiny and, relatedly, more numerous and more diverse mechanisms for accountability exists. As mentioned, the attention of the mass media is a significant factor in public scrutiny, but other factors such as “sunshine” laws, public disclosure requirements, and built-in checks and balances are of considerable importance.

**Personnel and Personnel System Model**

Public organizations differ from private organizations in that public employees, on the whole, have different attitudes about their work and somewhat different incentive structures. Those differences may result from self-selection processes, socialization, or personnel systems.
The attitudes that have been of most interest to researchers comparing public and private employees are those related to job satisfaction, organization commitment and, more generally, motivation. Studies of business and public managers indicate that business managers report more positive attitudes about their organizations and identify more strongly with them. In another study comparing work-related attitudes of public and private managers, Rainey found that government managers perceived a weaker relationship between performance and such incentives as pay, promotion, and job security. The government managers also scored lower on satisfaction with co-workers and with promotion and felt that personnel procedures were less flexible. In a later study, Rainey concluded that the lower expectation of reward for good performance accounts in large measure for lower levels of job satisfaction and organization identification reported by public managers.

One plausible explanation for the relative dissatisfaction of public managers is that government personnel systems are a source of frustration. One of the chief rationales for the Civil Service Reform Act of 1978 was to lessen the likelihood that the federal government would ignore performance of employees and reward either haphazardly or by political allegiance. However, the limited success of the act, an initiative intended to make government personnel policies similar to those encountered in business, is indirect evidence of the inherent differences in public and private management.

More direct evidence of public and private differences is provided by a recent survey of 14,000 federal employees, a clear majority of whom agreed that "supervisors here feel that their ability to manage is restricted by unnecessary rules and regulations." Buchanan contends that the excessive formality of government agencies is chiefly attributable to diminished authority. This interpretation is given some support by Rainey's finding that public managers score somewhat higher on formalization scales than their private sector counterparts. Others have argued that the formalism of public bureaucracy results from goal ambiguity and the absence of valid productivity and effectiveness measures.

Personnel systems in government are sufficiently unlike those of the private sector that one can safely assume that differences in such systems explain some differences in public and private organization behavior. But possibly the "raw material" may be somewhat different in the public sector. One study of graduate students' attitudes and values found significant differences between those intending to enter business careers and those planning to work in government. The public sector-oriented students scored higher on dominance, status-seeking, and flexibility, were more interested in being change agents, showed more skill in change-related activities, and were less oriented to wealth and personal monetary gain.

In sum, theory and research findings from a variety of studies employing a wide range of methods point to characteristic differences between public and private organizations. Table 1 summarizes the four models and the variables distinguishing public and private organizations.

<table>
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<tr>
<th>TABLE 1</th>
<th>Four Models of Publicness: A Summary of Propositions</th>
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<tbody>
<tr>
<td>Publicness Model</td>
<td>Distinguishing Variables</td>
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<tr>
<td>Economic Authority Model</td>
<td>(1) Market Failure</td>
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<tr>
<td>(a) Poor Information</td>
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<td>(b) Breakdowns in Competition</td>
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<td>(c) Transaction Costs</td>
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<td>(d) Externalities and Public Goods</td>
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<tr>
<td>(2) Property Rights</td>
<td></td>
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<tr>
<td>(a) Input of Entrepreneurs and Wealth-Sharing Managers</td>
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<td>(b) Inability to Transfer Ownership in the Public Sector</td>
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<tr>
<td>Political Authority Model</td>
<td>(1) Legal and Constitutional Structure</td>
</tr>
<tr>
<td>(a) Fragmentation and Inter-dependency</td>
<td></td>
</tr>
<tr>
<td>(b) Representativeness and Electoral Process</td>
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<tr>
<td>(c) Individual Rights</td>
<td></td>
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<tr>
<td>(2) Social Psychological Sources of Authority</td>
<td></td>
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<tr>
<td>(a) Public Expectations, Public Interest</td>
<td></td>
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<tr>
<td>(b) Civic Responsibility of the Individual</td>
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<tr>
<td>Work Context Model</td>
<td>(1) Time Frame</td>
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<td>(2) Political Cycles</td>
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<td>(3) Media Attention</td>
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<td>(4) Crisis Orientation</td>
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<td>(5) Accountability and Monitoring</td>
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<tr>
<td>Personnel Model</td>
<td>(1) Personnel Systems and Incentives</td>
</tr>
<tr>
<td>(2) Motivation, Job Satisfaction</td>
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<td>(3) Red Tape and Formalism</td>
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<tr>
<td>(4) Self-Selection</td>
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</tbody>
</table>

An Integrated Model of Publicness

Many of the propositions of the respective models are closely related. For example, the arguments of the Economic Authority Model about owners and wealth-seeking managers as a productive input is related to the Personnel Model's concern with the expectation of reward and its effect on motivation. Just as clearly, the electoral process which is part of the constitutional structure under the Political Authority Model is a political cycle affecting behavior under the Work Context Model.

The models are interrelated because they stand in hierarchical relation. The Political Authority and Economic Authority Models comprise the distal environment and introduce constraints which are broad and sweeping (e.g., market failures, public interest) and which are viewed at a high level of abstraction. These
more remote factors of the distal environment can be viewed as directly influencing the "proximate" environment (i.e., the Work Context Model) which, in turn, directly influences the attitudes and behaviors of individuals in organizations (e.g., the Personnel Model). This implies, of course, that the most fundamental differences in public and private organizations are those emanating from the (political or market) environment and that other differences, those more directly observed, are ultimately rooted in environmental differences. Figure 3 depicts hypothesized relationships among the models.

Public Management Information Systems

The integrated model of public organization environments provides a support structure for PMIS theory and prescription. The model is used to trace the impact of the distal and proximate environment of public organizations on PMIS performance. Figure 4 presents a typology of MIS performance measures which reflect the role of distal and proximate environment on performance measures for PMIS.

The operational level of performance of MIS relates most closely to the actual characteristics of hardware, software, and data. For example, the data collected, stored, and analyzed by MIS can be evaluated in terms of its accuracy, timeliness, redundancy, credibility, and so forth. These measures reflect on the performance of the data management component of MIS. Regardless of how well other aspects of the system perform, if the database performs poorly, techniques that convert data to information will produce misinformation to the organization.

Another technical component is that of applications and systems. Payroll, personnel, tax refunds, social security benefit calculation, and electronic fund transfer are examples of transaction-based applications systems. System performance for these can be gauged in terms of volume of processing per unit cost, counting deadlines met, and so forth. Another type of system employs modeling. Both statistical and decision-oriented models have become more and more automated at all levels of government. The appropriate technical measure for an automated model is that of the underlying model itself. For example, does the model predict accurately, or does the model provide useful results in a timely manner?

The third aspect of technical MIS performance is evaluation of system development or procurement. In terms of development, monitoring of project deadlines and schedules provides one measure of the development process. Another measure is how well the final products

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**FIGURE 3**

An Integrated Model of Publicness

(DISTAL ENVIRONMENT)

Economic Authority

Political Authority

(PROXIMATE ENVIRONMENT)

(Work Context)

Personnel and Organization Behavior

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**FIGURE 4**

Measures of Performance

<table>
<thead>
<tr>
<th>Proximate</th>
<th>Distal</th>
<th>Public</th>
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<tbody>
<tr>
<td>Private</td>
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<table>
<thead>
<tr>
<th>Operational</th>
<th>Managerial</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Efficiency</td>
<td>2. Exception Handling Ability (Accountability)</td>
<td>2. Protection of Rights (Due Process)</td>
</tr>
<tr>
<td>3. Timeliness</td>
<td>3. Visibility “Screw Up” Index</td>
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meet specifications or end user demands. Often, long time delays can lead to changed expectations and demands from end users and less acceptance of the system once developed.

End use is influenced by MIS personnel but not strictly controlled by them; much of what normally is considered end user performance measures falls under the responsibility of the management. Many of the traditional measures of MIS effectiveness within the organization, such as use and profitability, fall into this category. Measures of the end use of the MIS services include the level, intensity, and diversity of use. Economic analysis of MIS performance focuses on the profitability of a private corporation, measuring reduction in costs associated with MIS automation of functions, or carrying out full cost benefit analysis.

Many of the MIS performance measures appropriate for business are relevant to public organizations. But PMIS requires some unique performance measures and some shifts in emphasis. Accountability, for example, is important in both public and private organizations, but it takes on greater import within the public organization due to the nature of the proximate environment. Public managers are more likely to be accountable to individuals and groups outside the organization. Measurement of accountability should reflect PMIS’s ability to handle special queries that aggregate data in unanticipated ways, and produce special reports and analyses. These nonroutine forms of analysis will have extremely short time frames, thus adding the dimension of timeliness to the measurement of accountability.

Another managerial performance measure that is PMIS-specific is the concept of benefit savings. Private organizations monitor costs and the quality of the product or service (output) and measure performance in terms of reduced costs or increased quality. But public managers obtain resources in a different fashion so that reduced cost does not necessarily imply improved performance to the organization. Public programs are often evaluated based on their aggregate budget size (inputs). Public organizations which improve delivery of their services, do so by better control of the benefit stream (outputs) rather than through control of costs. For example, most state welfare programs have measured the PMIS performance in terms of the number of ineligible recipients identified and the concomitant reduction in services provided, i.e., long-term future benefit savings. This criterion is heavily used by federal and state governments when carrying out computer audits of AFDC and food stamp programs.43

Most of the differences between PMIS and private sector information systems arise from differences in the distal environment. Except for market, investment, and product research, externally-based MIS evaluation is rare in the private sector.44 In the public sector the absence of an external perspective is often damaging. The final customer for public goods and services is the public-at-large, who (as argued in property rights theory) usually have limited ability to influence the mix of “products” and inputs. Public officials’ satisfaction (a surrogate for citizen satisfaction) with the final set of goods and services is one measure of PMIS performance. Another is the general public’s attitude toward privacy safeguards. Such measures are important indicators of technical success of PMIS since it is often the case that the public voluntarily provides the data (e.g., tax returns, census data) requested for inclusion in PMIS.

An additional concern in evaluating PMIS at the environmental level is the degree to which the PMIS responds to external requests for data. Private organizations provide information to government regulators and sometimes trade in secondary markets with their data (e.g., mailing lists), but public organizations must respond to superior government bodies, private citizens, and peer agencies. During budget cycles executive branch agencies and legislatures require data to evaluate public agencies. More recently the role of data sharing beyond the organization has become important. For example, the use of computer matching to carry out program audits uses individual records from different public agencies (e.g., IRS and Selective Service).45 The degree to which an organization responds to external data requests in a timely fashion with appropriate and accurate data can have either positive or negative effects on MIS within the organization.

PMIS Guidelines

Thus far we have suggested that public sector MIS is sometimes sufficiently different from private sector MIS to require separate theoretical treatment and different prescriptions for MIS practice and performance. In this section some PMIS prescriptions are presented and categorized according to the respective model from which each is derived. Each guideline could be framed as a research question.

Economic Authority and PMIS

The guidelines grouped under the economic authority category are chiefly concerned with the consequences of the lack of economic authority. The question, then, is “given a limited base of economic authority, what are the implications for performance and design of PMIS?”

Guideline No. 1: Economic efficiency is but one of many important criteria for evaluating the effectiveness of a PMIS. In private organizations it is meaningful to evaluate MIS performance on the basis of its economic efficiency with respect to production processing and profitability and with respect to the organization as a whole.46 Although evaluating public organizations based on measures of production efficiency is often meaningful, it is often more difficult. Moreover, evaluating PMIS exclusively according to economic efficiency criteria is usually inappropriate.

Often the justification for locating a program in the public sector is that its benefits are desirable but cannot, for one reason or another (e.g., externalities, inappropriability), be sustained in a market environment. More often than not, inattention to political constituencies
and equity norms in the establishment of PMIS can lead to serious problems. In Massachusetts, an overzealous attempt to ferret out welfare cheats by computer matching AFDC account information with private bank account records led to premature cancellation of welfare benefits for eligible clients. The result of this failure to take into account due process guarantees was several major successful suits against the Commonwealth.

The introduction of computer-based modeling to allocate police patrol units was based on concepts of economic efficiency. Here the failure to take into account the role which discretionary authority played in rewarding senior level police officials, resulted in the eventual demise of such systems. At the federal level, the threat to personal privacy killed a proposed Tax Administration System which would have given 48,000 IRS employees access to the tax returns of all individual and corporate taxpayers. Unless PMIS performance is completely separable from the nonmarket mission of the agency (an unlikely contingency) performance evaluation based primarily on economic efficiency is inappropriate.

Guideline No. 2: Avoid the use of PMIS as a personal reward or side-payment. Property rights theory argues that public sector decisions and managerial activities are much more likely to center on side-payments because, unlike the private sector, it is less often possible to link managerial input to performance. Side-payments often center on expansion of personnel lines, budget increments and perks. In the public sector, computer technology and MIS control and access can sometimes serve as a side-payment. One of the major difficulties with the use of PMIS as a side-payment is the potential for abuse when exploited for personal gain (e.g., hoarding of information, invasion of client or coworker privacy). Various types of information leaked to the news media that adversely affected specific individuals or policies may in part be symptomatic of unwarranted access to MIS.

A second difficulty that arises from the use of computers as side-payment is the potential for rapid proliferation of incompatible equipment and software due to lack of coordination. The GAO is constantly criticizing line agencies for ad hoc decisions with regard to purchase and implementation of computer systems. Recent studies of Treasury, the Federal Judiciary, and the Army Corps of Engineers identify a general lack of coordination in the acquisition of computers.

Political Authority and PMIS

Political authority implies interdependence, legal and statutory constraint, and sensitivity to political cycles. Each of these factors should be taken into account in design and execution of PMIS.

Guideline No. 3: PMIS planning should be incremental/contingent rather than holistic/rational. Generally speaking, planning for MIS should be forward looking and comprehensive. Today’s hardware and software should consider tomorrow’s needs and technological possibilities. Purchases should be coordinated and a holistic approach to MIS planning is usually the most appropriate. In the public sector, however, external control and sensitivity to political change requires a different approach for PMIS planning.

For example, the Brooks Act in the federal government divides the responsibility for policy making (OMB), setting standards (NBS), and procurement (GSA) for automatic data processing. This structure creates significant constraints that prevent long-run, comprehensive planning. One symptom of this is that average computer contract awards for the last six months of 1980 took between 26 and 39 months to be implemented.

Political executives’ understandable concern with political cycles and quick results can undermine the long-term managerial objective of PMIS.

Another constraint that undermines effective planning is the budget process. The assistant secretary for administration in the Treasury Department stated in a response to a critical GAO study that, “the Department has found the utility of long-range plans to be limited because of the uncertainties inherent in the Government budgetary process.”

Guideline No. 4: PMIS planning and system design should anticipate as much as possible the need for extrorganizational horizontal and vertical linkages. While on some occasions private sector organizations use MIS as a link to the external environment, most uses are internal to the organization. In the public sector, PMIS is used not only to monitor the environment but as a means for external actors to interact with and even monitor the focal organizations. The heightened accountability in the public sector often mandates that PMIS provide direct access for official actors outside the organization. In the absence of external access, the PMIS can become a small fiefdom of knowledge available only to insiders and to be used as a negotiable instrument in dealing with executive branch superiors (e.g., cabinet officials), watchdogs (e.g., GAO, legislative subcommittees) or other responsible parties.

Not only is it important to link PMIS to enhance accountability but also to avoid duplication, overlap, and potential for working at cross purposes against peer agencies. The interdependence of public organizations dictates horizontal linkages in the structuring of PMIS. In some cases (e.g., criminal justice data system), the PMIS is a resource for a variety of actors within a policy domain, even though the design of the system and its ownership may be vested in a single agency. State-run motor vehicle bureaus provide information to local police on ownership of motor vehicles, while at the federal level the FBI provides information directly to aid in local law enforcement efforts. There are few private sector parallels to this type of organizational interdependence.

Several additional examples illustrate this point. At the federal level a recent GAO study investigated the
advantages and disadvantages of the transfer of IRS and SSA data to other government agencies for use in computer matching projects to verify eligibility for entitlement programs. One of the major conclusions of the study was to recommend that self-employment earnings data, reported by the taxpayer, be used to verify income in more entitlement programs than just AFDC and Food Stamps. This came shortly after Congress had passed laws providing for the similar use of IRS documents reporting unearned income for matching.12

Work Context and PMIS

The effects of work context on PMIS are especially pertinent to the structure and routines of public management.

*Guideline No. 5: The PMIS chief should not function at the top of the executive structure in public organizations.* MIS success in the private sector is closely related to the support and attentiveness of upper level executives. A familiar guideline presented in the MIS literature suggests that the MIS chief should report to the highest level of the organization. In the public sector, however, the highest officials are more likely to be political appointees and less likely to be involved in operations management. Political executives’ understandable concern with political cycles and quick results can undermine the long-term managerial objectives of PMIS.

Since 1980 and the Paper Work Reduction Act, the federal government has tried to establish a general purpose position for information management, the Information Resources Manager (IRM). The rationale for such a position is that centralized planning and control of information, a valuable resource for decision making, should operate at the highest level of the career civil service. Further impetus for the idea was generated by the Grace Commission Report which endorsed the idea of the IRM. Yet six years after the act, the number of IRMs is small and in most cases they are former EDP managers who have more responsibility but no more resources.

At the local level, Kraemer and associates found that the development of computing only occasionally involved high level public officials such as city managers, mayors, or city council members. The impetus for the computing usually came from heads of finance departments and later, during periods of resource scarcity, “policy was made by a pluralistic process dominated by the large user departments and the computing unit.”13 Kraemer and his colleagues recognize that top management did intervene in computer policy, but rarely and only to redefine the ground rules for allocation of the resource.

*Guideline No. 6: Procurement policy should give greater emphasis to leasing and PMIS resource sharing.*

In the private sector, the capital invested in MIS can be depreciated for tax purposes and, in many instances, the equipment can be sold when the needs of the firm have expanded or when the equipment is for some other reason outdated. Public sector organizations can neither take advantage of depreciation allowances nor, in most instances, expect to receive fair market value for outdated or outgrown equipment. Thus equipment leasing and sharing is often a much more attractive alternative in development of PMIS. This is especially the case when planning processes are more contingent and less holistic because of political changes and resource constraints.

The procurement process in the federal government reflects the interdependence flowing from political authority (see Guideline No. 3). Many of the successes both in a managerial and political sense can be traced to the use of leasing options in government, as in Brazoria County, Texas, where the county clerk was able to free herself from an unproductive dependence on the county’s centralized computing system by leasing equipment and software to manage the vital statistics for the county.14

*Guideline No. 7: PMIS requires a protracted period of testing and prototype development.* Typically, public sector mistakes loom large. A computerized welfare payout system that fails may affect hundreds of welfare clients living at the margin of subsistence. In light of the higher impacts of PMIS, the pressures for accountability, and the visibility of public programs, PMIS developers are well-advised to take great care before implementation. In the private sector, it is often better to act precipitously than to fail to act. This is less often true in public agencies.

In Georgia, the development of a computer-based system to generate a list of prison inmates eligible for parole was not adequately tested. As a result, the name of one inmate convicted of multiple homicides appeared on the list after serving only seven years. The immediate effect was outrage from judges, prosecuting attorneys, and the public at large. The error caused such an uproar that the parole board decided not to publish the list again.15 Another example of this type of difficulty comes from the design and implementation of a statewide system to supply Food Stamps, Aid for Dependent Children, and Medicaid benefits to over 320,000 Georgia residents. Developed by the USDA, the Georgia Public Assistance Reporting Information System (PARIS) failed to provide sufficient computer resources to handle the number of cases. This resulted in duplication of some benefits and delays of over a month for legitimate claims to be processed. The problem persisted over many months, and after a time the Medicaid processing was contracted out to reduce the load on PARIS. This led to further problems, with as many as 10,000 eligible recipients categorized as ineligible and a major communications breakdown between hospitals and the state, preventing clearances on eligibility status.16

*Guideline No. 8: PMIS is generally not a useful means of enhancing managerial control.* Many private sector managers are initially drawn to MIS as a means of exercising and augmenting control. In the public sector, MIS is less likely to be an effective tool for managerial control. In the first place, managerial control is often traded off against accountability. Thus any
straightforward attempt to use PMIS to enhance managerial control is likely to meet with some resistance, perhaps diminishing the value of PMIS as a managerial tool. A survey of top managers in 42 local governments found that "Top managers tend to feel that computers have had little effect on their ability to control units under their responsibility, to identify problems, abuses, or inefficiencies in these units, or to monitor the performance of individual subordinates in these units."

Personnel Systems and PMIS

Some of the most pronounced differences between public and private management are in personnel systems. Many of the differences have important implications for the design of PMIS.

Guideline No. 9: PMIS should not be rationalized on the basis of labor savings. Although PMIS has sometimes been sold on the basis of alleged labor savings and personnel replacement, there is little reason to believe that PMIS has significant labor reduction benefits. Many public jobs are protected by civil service and others are protected by an even more powerful guarantee, political quid pro quo. Moreover, labor reduction in the public sector is not an unqualified benefit. There is a long tradition of viewing public employment as a wedge against unemployment and in many instances only a small cost differential exists between support by public employment and support by public welfare. Unlike the private sector, personnel displacement cannot be easily defended on productivity grounds in view of the nature of many public goods and services and the role of public jobs as a safety net.

Guideline No. 10: PMIS personnel markets are less elastic and PMIS planning should be sensitive to constraints of nonmarket hiring. There is likely to be little correspondence between the productivity gains accruing from PMIS and funds and positions available for hiring PMIS staff. As Levine has suggested, MIS personnel are usually the first bid away in the market place. Public agencies have only limited ability to compete for PMIS personnel, limited flexibility in hiring practices, and limited support for in-house training. In designing a PMIS system, it is usually advisable to ask at the front end of the planning process who is going to operate and maintain the system. Personnel projection should, because of personnel system constraints, be quite conservative and PMIS development should not begin assuming that staffing will "take care of itself."

Year after year, the major professional organizations for government computing have reiterated the problem of hiring qualified staff. A 1980 report of the National Association for State Information Systems (NASIS) identified for the third year in a row that recruitment of trained personnel is the most difficult external problem facing state information systems.

MIS and PMIS: Some Conclusions

This paper has examined the current framework for studying and prescribing for management information systems. The basic conclusion has been that the design, implementation, and evaluation of management information systems differ between public and private sector organizations. Prescriptions are summarized in Table 2 and operate through both the distal and proximal environments of the organization.

<table>
<thead>
<tr>
<th>Table 2 Summary of Differences Between MIS and PMIS Prescriptions</th>
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<tbody>
<tr>
<td>Public Evaluation:</td>
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<tr>
<td>Economic Efficiency</td>
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<tr>
<td>Political Efficiency</td>
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<tr>
<td>Policy Mission</td>
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<tr>
<td>Planning:</td>
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<tr>
<td>Incremental</td>
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<tr>
<td>Extraorganizational</td>
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<tr>
<td>PROXIMATE Structure:</td>
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<tr>
<td>Below Political</td>
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<tr>
<td>Practices:</td>
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<tr>
<td>Leasing</td>
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<tr>
<td>Less Labor Savings</td>
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<tr>
<td>Tight Labor Supply</td>
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</tbody>
</table>

In a paper seeking to identify differences between public and private sector MIS, it is appropriate to close with the observation that there may be at least as many similarities as differences between the needs, practices, and applications of the sectors. But as computers and MIS come to be increasingly influenced by the public agency environment, the trend of divergence between PMIS and business practice will likely accelerate.

In sum, the MIS prescriptions developed for business organization are not altogether inappropriate for public organizations, but when the typically different environment of the public organization is a mitigating factor, PMIS and MIS often diverge.

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Notes


17. An example of some earlier work along these lines primarily focused on the federal level is Robert Head, *Federal Information System Management: Issues and New Directions* (Washington: Brookings Institute, 1982).


22. Ibid.


38. Buchanan, op. cit.


43. U.S. Senate Subcommittee on Oversight of Government Management of the Committee on Governmental Affairs, Oversight of Computer Matching to Detect Fraud and Mismanagement in Government Programs (December 15 and 16, 1982).


54. Danziger, et al., op. cit., Chapter 5 discusses the evolution of policy making in local governments for computing, p. 121.


60. Levine, 1981.


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