Productivity Issue Poses Important Challenge to Transportation

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A major issue for the next decade is improving productivity in both the private and the public sectors. The plight of the U.S. automobile and steel industries is illustrative of how industry in general has not kept pace with technological advances, management practices, and sufficient levels of capital investment to keep the United States competitive with foreign manufacturers. The recession has further exaggerated the problem by causing not only a loss of market shares but also a loss in sales in absolute terms.

The recession and lack of growth in real income have resulted in the public's rethinking of its demands for public services, including transportation. As personal incomes have remained static or declined, people have not been willing to let federal, state, and local governments continue to take an increasing share of their gross income for services of questionable value or for programs that are not effectively and efficiently managed. State legislatures have required that executive agencies prune their programs and reduce their manpower. In spite of increases in tax revenues for transportation, the real income (purchasing power) of transportation programs has been declining since the early 1970s. As a result, publicly funded transportation programs have been undergoing major productivity improvements.

Feature

PRODUCTIVITY'S ELEMENTS

Productivity encompasses two elements. First, it is concerned with how well an activity achieves its objectives. Second, it is a measure of how efficiently resources are used in performing these activities.

A further definition of productivity relates to attempts to increase the amount of production (goods or services) with the same or fewer resources. More simply, if we increase the units of output without increasing costs (inputs), or if we produce the same number of units at less cost, we are increasing productivity. Also, when we change the quality of a product, thereby better satisfying customers, we increase productivity.

For many years the public believed that problems (e.g., public housing, transportation) could be solved by overwhelming them with money. It took a great deal of wasted resources before the public was convinced of the fallacy of this concept. Then, the pendulum of public opinion swung to the opposite viewpoint, i.e., that publicly funded programs are inherently inefficient because there is no competition or profit and loss to motivate efficiency. The current thrust focuses on the idea that the free marketplace is still the best mechanism for allocating resources.

This situation has left state and local transportation agencies in a quandry: they are expected to deliver the same services but are given fewer resources to do it. Given this environment, they have done remarkably well in meeting this dilemma.

TODAY'S GOALS

Today the goals of transportation are frequently contradictory, and success and reward systems are confused. How do you reconcile design standards meant to improve safety with the need to preserve the current transportation system when resources are not sufficient to do both? How do you define the mix of each, given current levels of resources? Do you design systems to meet a design cost or increase the costs to meet the desired design?

Each actor who influences a decision or carries it out affects the productivity of an agency. The public, the legislature, the lobby groups, the agency management, and the labor force all influence productivity. Before productivity can be improved, we must understand the bargain that each is willing to accept.

How does an organization, either public or private, improve its productivity? Three elements are involved in improving productivity. They can operate alone or in concert:

1. Increasing the level of capital investment,
2. Improving the effectiveness and efficiency of management, and
3. Increasing labor output, both in quantity and in quality.

When people gave up being nomads and settled into permanent communities based on agriculture, they learned that not all the grain grown could be consumed. Some was needed to provide seed for the next year's crop. In transportation, this translates into investment capital in the form of revenues to maintain and improve highways, transit facilities, waterways, and airways. Since these systems wear out (and if we are not to consume our "seed corn"), we must either set up reserves for depreciation, as the private sector does, or maintain a program of adequate public reinvestment. In so doing, the impact of technological innovations on market demand must be taken into account. For example, when railroads delivered goods to more places

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faster and more cheaply than canals, canals went out of business.

One of the main functions of government is to prevent shocks to the social and economic structure of the country caused by too rapid changes in markets and technological innovations. Whether it be the agricultural revolution or the highly mobile automobile society, the government's role is seen as mitigating the short-term disruptive effects on those segments of society not capable of rapid readjustment. These take the form of agricultural subsidies, public housing, transportation subsidies, and other support programs.

In the private sector, productivity changes are tied to the economics of production and marketing. In the public sector, while the management of government activities is supposed to be productive, the programs themselves may be counter-productive because of the social considerations involved. For example, special services for the elderly and the handicapped add costs to public investments that would not be incurred if the marketplace strictly determined the delivery of services. In like manner, wage rates paid for public construction projects might be substantially less if the Davis-Bacon Act did not prevent contractors from employing labor at the lowest rates set by local markets. Thus, public welfare considerations often prevent government from operating as a private firm would in a free competitive market in the supply of goods and services.

MANAGEMENT ACTIVITIES

Management may be defined as the coordinated direction of capital and labor to achieve a desired end. Its primary activity is information processing to arrive at decisions that will accomplish the goals of the organization. The concepts of management are based on the social consciousness of the society within which it exists. As society changes, so does the theory of management.

If management can induce new technological advances through research, and if it can obtain better cooperation and level of effort from the labor force, then management productivity increases. However, management productivity improvements require change—change in the management process and in the manager's behavior. It means changes in who exercises power and authority and how it is exercised. Because of this, management is prone to seek productivity improvement from capital and labor before changing its own processes. It is generally only in crisis situations that the management processes change. In the public sector, these crises occur with dramatic shifts in public expectations and demands.

In the 1950s, the public strongly supported the tremendous increase in mobility provided by automobiles, and the Interstate highway program was initiated. A management process was developed to maximize the construction of new highway facilities. However, highway and urban development brought with it many adverse social, economic, and environmental consequences, and as public expectations and goals changed, management processes were forced to change with them.

New system construction was exciting for management, and resources were devoted to it at the expense of maintaining existing facilities. Now the public is demanding that the systems be better maintained and rehabilitated or reconstructed where deterioration is excessive. The management process is again changing. Planning activities, especially long-range planning, have been curtailed severely and staffs reduced. Construction and design staffs have been cut. Centralized decisionmaking, which was appropriate for rapid new construction programs, is being replaced with decentralized decisionmaking, and central office staff activities are being reduced. It is now recognized that those who are in the field rather than central offices have better first-hand knowledge about the conditions and the need for maintenance and reconstruction of the facilities under their jurisdiction.

Participatory management boosts productivity.

As decisions are made at lower levels in transportation agencies, there is less need for the multiple levels of management to review and process information to central management. Accordingly, these positions are being combined or eliminated. In New Jersey, 1,100 supervisory positions in its transportation department were reduced to about 700. In the Pennsylvania Department of Transportation, the number of administrative employees was reduced from 714 to 462 over a 4-year period. The departmentwide percentage of the budget spent on personnel was reduced by 10 percent. In Texas, the 24 district engineers in the Department of Transportation deal directly with the local governments and elected officials rather than negotiating through the central office. Central office staffs have become more involved in assuring standardized procedures.

Governments have followed the military hierarchy's approach to making decisions: information flows from the bottom to the top management; decisions are made there, and are then transmitted back down to those who will execute the action. While this centralization of decisionmaking coordinates the overall strategy of the organization, the lines of communication are long and the information transmitted is minimal and subject to distortion at each point of relay. With the advent of electronic computers, massive amounts of information can be generated at operating division level and transmitted to top management. This may be done rapidly without being subject to interpretation on the way to top management, thus permitting timely and accurately based decisions.

However, three problems with the gigantic growth in information systems are surfacing:

- It offers too many decision opportunities for a limited number of top managers.
- It makes no distinction about the importance of the decision or the most appropriate level in the organization for making those decisions.
- It concentrates the decisionmaking structure vertically and tends to reduce lateral communication among units that are dependent on and should interact with each other.

While transportation agencies are developing their information systems, they are also recognizing that greater attention should be given to reducing decisions to the lowest level of management capable of making them. This then permits top management to be concerned with goals and how effective the organization is in achieving them rather than with daily operating issues.

ROLE OF STRATEGIC PLANNING

A number of states are creating a strategic planning process to review goals and identify potential problems. The process is used to

1. Identify the goals of the agency and measure success in achieving them;
2. Identify external factors that will impact on the future viability and success of the organization;
3. Focus attention on equity and policy issues implicit in current goals, programs, and activities; and
4. Review general organizational structures and operations to assure that they are the most effective and efficient ones to achieve the stated goals.

Government agencies are primarily reactive to the public's expectations and to the political processes. However, the strategic planning process enables management to anticipate impending crises and needed changes in programs and to react quickly when necessary.

An example of strategic planning is the state's experimentation with contracting out activities. The use of contractors (a) permits the agency's work forces to be evenly balanced and scheduled throughout the year and (b) allows the forces of the marketplace to produce a competitive pricing system for services that government-performed activities do not have. Many states are now experimenting with contracting out construction, maintenance, and operations activities (e.g., construction inspection, snow plowing, patching, mowing, lighting, and maintenance of traffic control devices) with varying degrees of success.

Table 1. U.S. labor force: 1890, 1950, 1980.

Factor	1890	1950	1980
Total labor force	23.3 million	63.9 million	104.7 million
Total women of working age	23.1 million	54.3 million	86.4 million
Percent in labor force	(17.3%)	(33.9%)	(51.6%)
Total men of working age	24.4 million	52.4 million	77.7 million
Percent in labor force	(79.9%)	(83.6%)	(77.4%)
Total women in labor force	4.0 million	18.4 million	44.6 million
Women as percent of labor force	(17.2%)	(28.8%)	(42.6%)
Total men in labor force	19.3 million	45.4 million	60.1 million
Men as percent of labor force	(82.8%)	(71.2%)	(57.4%)

Note: Data from 1890 and 1950: U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1979;* 1980 data, U.S. Department of Labor, Bureau of Labor Statistics.

Some problems are so difficult they can't be solved in a million years unless someone thinks about them for five minutes.
—H.L. Mencken

Significant efforts and success have been achieved in transportation agencies in improving productivity in both capital investment and management processes, but an area that has not shown major productivity gains is in increasing labor effort and cooperation.

While there has been a decrease in the number of positions in transportation agencies, this is primarily because of budget reduction pressures and not the result of productivity improvements. Services have often been reduced. For example, many states that mowed grass along highway rights-of-way five or six times during the summer are now cutting only once or twice. Most staff reductions have been accomplished through job freezes, normal attrition, and inducements for early retirement. (Although such early retirement may reduce the agency's costs, it remains to be seen whether it will cost the taxpayer more in the long run.)

When funds were readily available, technical and supervisory training programs were developed and widely used in state departments of transportation. However, as resources have not been sufficient to meet needs, training programs have been a prime target for budget cutting. In New York State such budget cuts were offset through collective bargaining agreements with the two state employees' unions. These agreements called for employee development and training programs in the amount of $1.75 million for 1983-1984 plus $950,000 for supplemental training programs for supervisors and for employees subject to displacement.

State civil service agencies are recognizing the costliness and inefficiency of having too many job classifications. In Tennessee, the number of job descriptions has been reduced from 4,000 to 1,500.

The transportation sector has been slow in implementing new labor-management practices. The railroad sector, because of financial crisis, is undergoing major changes in work rules, crew sizes, and basis of pay—all of which affect labor productivity. The transit sector is only lately recognizing that, as an industry in which 80 percent of the costs are labor-related, its future viability is dependent on improving labor productivity.

Industry has recognized that workers are more aware than management or outside consultants of productivity problems relating to their jobs and are better able to redesign their individual and group activities. By being directly involved in the design of their work activities, workers also feel a greater sense of responsibility for their jobs.

QUALITY CIRCLES, WORKING LIFE

Though designed in the United States, Japan has applied the principles of quality circles and quality of working life to improve its productivity and worldwide economic competitiveness.

Quality of working life encompasses a number of areas in addition to job redesign. Techniques, such as job enrichment, alternative work schedules, incentive systems, training programs covering issues both on and off the job (e.g., coping with stress and personal problems), cross-training for other jobs, and non-job-specific labor-management committees, are being used to improve labor relations and, in turn, improve productivity.

Transportation agencies have recently begun initiating quality of working life programs for improving productivity. Among these are

1. The use of alternative work schedules,
2. Suggestion systems,
3. Incentive systems,
4. Methods and procedures improvement programs,
5. Stress management and personnel counseling programs,
6. Leadership and management training, and
7. Quality circles.

Few agencies, however, have done formal evaluation on how such programs have affected productivity.

The application of participatory labor-management practices in the public sector will be impeded because of the political nature of government. With top management subject to partisan political appointments, and with governors and legislatures committed to implementing campaign promises, the career bureaucracy does not have the continuity or commitment of top management nor the necessary long-term goals to fully develop a participatory labor-management program. However, improvements may still be made in employees' work environments and productivity by continual education and the re-commitment of top management.

WHAT DOES THE FUTURE HOLD?

In summary, future prospects for productivity improvements in the government-funded transportation sector are beginning to develop a pattern. First, there is an increasing concern about the need to review the goals and objectives of transportation. What price are we willing to pay for mobility, and how much can we afford? Who benefits from transportation services, and how should costs be allocated? How much should the market determine the supply of services, and how much should social and welfare considerations influence transportation investments? What role should the federal government and the state and local governments play in using transportation to influence the private sector's competitive position? What criteria should be used to allocate limited resources? How do you measure performance against these goals?

Another major issue still to be resolved is defining the proper role of governments in the provision of transportation services. Should governments become merely the managers of public funds and rely on the private sector to execute the programs? How does the government protect the public from exploitation and lack of responsibility in the private transportation sector? When should government regulatory powers be exercised? When should government subsidies be provided?

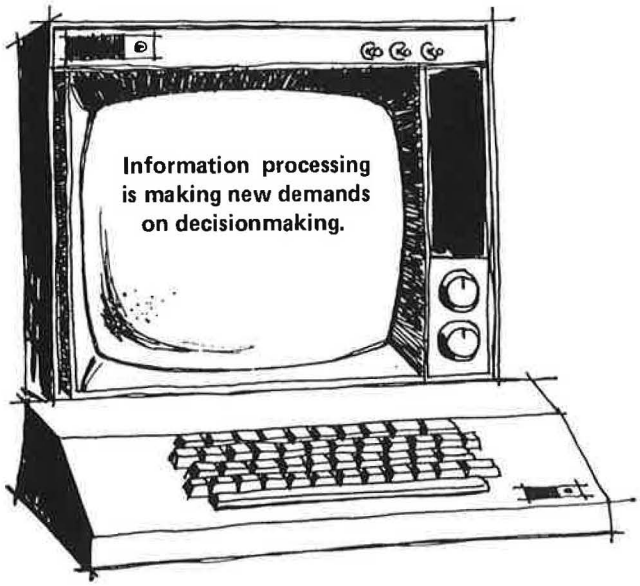
Because old assumptions and solutions are being questioned, the following developments are likely to occur.

1. There will be substantial research done to find lower-cost materials and ways to reclaim existing materials to reduce the reconstruction costs of the nation's infrastructure.
2. There will be a closer identification of who benefits from different transportation systems, and service levels will be tailored according to willingness to pay the costs. The current jargon for this concept is "benefit sharing."
3. Because the transportation sector is primarily a custom-design market rather than a mass market, government research and development funds will be needed to induce major technological innovation especially in the public transportation sector and in total new systems design (e.g., automated guideway vehicles).
4. Life-cycle costing of transportation investments that will minimize maintenance requirements will be a prime management concern.
5. Automation and application of computers to information processing systems will be accelerated.
6. Management will become more decentralized and democratized. There will be fewer levels of management, and they will become more specialized. Top management will concentrate on goal setting and issues of policy and equity. Middle management will be concerned with horizontal and vertical communication systems. Operating management will have a broadened responsibility for managing the actual work process. At every level, management will emphasize consensus rather than individual decisionmaking.

Table 2. Percentage of workers in major employment areas.

Census Year	Agriculture	Blue Collar/ Manufacturing	White Collar/ Service Workers
1910	31	38	31
1920	27	40	33
1930	21	40	39
1940	17	40	43
1950	12	41	47
1960	6	40	54
1970	3	37	60
1980	3	30	67

Note: Data from (for 1910-1970) *Historical Statistics,* part 1, p. 139, based on census data; (for 1980) Bureau of Labor Statistics, *Employment and Earnings,* January 1981, pp. 180-181.



7. There will be less distinction between labor and management both in power and in reward systems (when a small labor segment of the work force can strike and thereby shut down the entire organization, there is a de facto power shift).

8. Individuals will have more power to determine their work environment. Accordingly, they will also have more responsibility in ensuring the efficiency of their operations.

9. The vast majority of individuals will not be involved in actual production activities. There will be substantial economic pressure to reduce service costs. The result will be a re-examination of the role of work itself. Much greater emphasis will be given to individual and group creativity.

WHAT HISTORY TELLS US

A study of history demonstrates that the factors that made a country, society, or organization great were also the factors that led to their demise. This is due to the inflexibility and reluctance to change established success patterns operating within the organization. As conditions changed, the power structure and rewards system failed to change with it and the organization could not adapt to these changed conditions. The current approach to government is one of crisis management. It remains to be seen whether the transportation sector will respond voluntarily to demands for productivity increases or whether these will occur only through crisis shocks. In a broader sense, the issue of transportation productivity will be influenced, if not determined, by what happens to national productivity.

There is considerable "gamesmanship" being reported in the press in comparing U.S. productivity improvements with those of other countries. There is much concern that, as a nation, the United States should be "trying harder." However, rather than trying harder, the winner in the "productivity game" will be determined by who is "trying smarter"—that is, who best comprehends the changes taking place in a world society and interprets these changes into investment policy, management practice, and labor relations. It must be recognized that the American self-image and measures of success of the past 50-75 years may not be suitable as the nation approaches and moves into the 21st century.

Correction

In the September-October 1983 issue of *TRNews* the name of Daniel Watkins as co-author of the article, "Kansas Department of Transportation 'BAMS' Away at Bid-Rigging," was inadvertently omitted. Watkins is Special Assistant to the Secretary, Kansas DOT.