

An Analytical Framework for Evaluating Public Policy in a Competitiveness

Context:

"Total Quality Management" in Massachusetts State Government

by

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**B.S. Mechanical Engineering University of Rochester
Rochester, NY 1985**

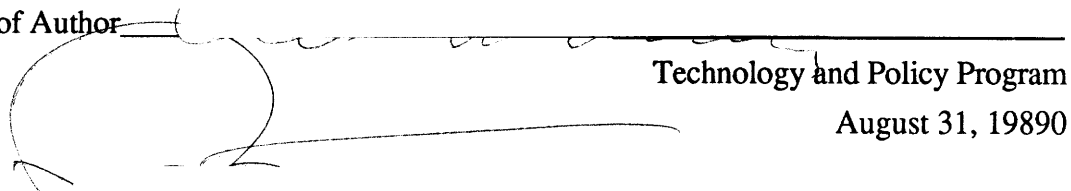
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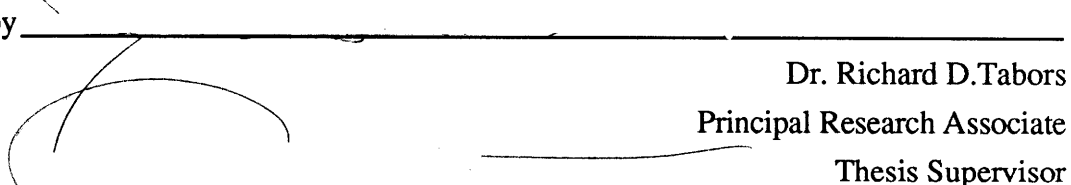
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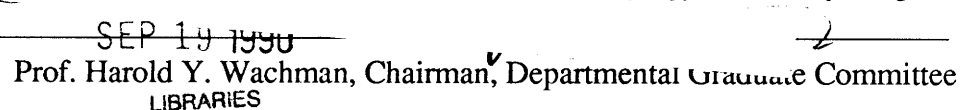
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Abstract

The current economic and political morass that the commonwealth of Massachusetts is presently in has raised serious questions about how much real control any state has over its economic situation. Past state government efficiency studies and policy initiatives have not kept the voting public from loosing faith in their local government and the threats of a major referendum drive in November to repeal any tax increase has kept the 1991 budget in a limbo status.

This paper contends that the major problems which plague the state can be framed in a "competitiveness" context, and that the state government can be accurately modeled as exhibiting industrial characteristics, allowing the usage of past business experience as a guide for formulating a solution. Industrial experience has shown that major increases in productivity, and ultimately competitiveness, are only derived when the entire business organization is examined with regards to how well it meets the customers needs: a Total Quality Management (TQM) approach.

In Massachusetts the philosophy of TQM can be used to improve service and reduce costs. By creating a state government which is a learning organization, as quality of service goes up, the overall cost per unit should decrease. In addition, A TQM program will create a system where the part of the government responsible for administrating the services can influence the types of policies and programs created; resulting in increasing the abilities of what the government can do and the options available to the government when it is debating what it should do.

TQM programs are perhaps the only viable long-term way a state can improve its competitive position for two reasons. First, many of the problems which are confronting governments are fundamentally non-linear in nature and TQM programs are best able to handle these situations. Secondly, only TQM programs have the combined emphasis on communication and measurement systems which this state needs in order to depoliticize the present economic debates. The philosophy of TQM has already been incorporated to some extent in the state government through the 1990 Governor's Management Task Force; but for the proposals suggested in that document to work, the philosophy behind them must be understood by all.

Thesis Supervisor: Dr. Richard D. Tabors

Title: Principal Research Associate

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There are many people whom deserves special credit and thanks for their contributions, and suggestions which made possible the completion of this project.

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As I look back on these last four years, which have not always been the most fun I could have hoped for, I realize that the TPP program and the educational path I pursued was the proper choice for me. I wish again to thank all the professors in that program for providing me a unique and worthwhile educational experience. I would easily repeat my decision to join the TPP program if I had it to do over again.

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Preface

Introduction:

The state government of Massachusetts is facing a crisis. It is primarily neither a fiscal, nor an industrial crisis, although both elements are present to some extent. Rather the underlying problem arises from a lack of confidence by the voters in the government. This is not endemic to Massachusetts alone, although its recent past has probably focused more national attention on this state than would have otherwise occurred. Massachusetts is being confronted with external problems it has little control over, internal changes in the population, and its own recent political history. While the crisis at its root might be a confidence problem, there are some serious economic consequences. It has become clear that however one defines the problems in Massachusetts, they have, compounded with a national economic slowdown, pushed the Massachusetts economy into a recession-like period. The cyclical nature of Massachusetts economic and social fortunes over the last 15 years have added to the voters feelings of uneasiness. Comparing the present situation with that in 1986 and 1987, when Massachusetts was being held up as a model for the nation, raises some serious questions. Was it all a lie? Is it possible for a state to go from being a model of public policy to one whose bond rating approaches a junk bond in just a few years? What really is happening, and has happened to the state?

The question that arise are endless, as are the accusations, the heros, and the villains. There have been three¹ Massachusetts government efficiency studies done since the time Dukakis first took office in 1975 as well as a variety of policy initiatives for each new administration. The sum of all this work has not saved us from the situation which we are presently in. The problems of balancing revenues and expenditures in a period of growing social and economic problems: education, welfare, health insurance, homeless, etc. lead us to the question not only the the usefulness and effectiveness of these policy initiatives and government efficiency studies, but of any state actions. The situation has been framed quite well by Kanter².

¹ These are the Governor's Management Task Forces (GMTF) of 1975 and 1979, and a separate initiative by the Massachusetts Tax-payers Foundation in 1987. A fourth one, which will be discussed latter in the thesis derives from the GMTF of 1990, just published.

² Dukakis, Michael and Rosabeth Kanter; Creating the Future, chapter 1 "Investment Economics and the politics of Partnership: Lessons from the Massachusetts Experience", Summit Books, New York; 1988. p. 13. This book is a amalgamation of business philosophy and government philosophy. Two of the chapters are written by Dukakis, the first chapter by Kanter who is a professor at the Harvard Business School, the rest is an cumulative effort by business and government people

" There has been an increasing debate recently on the proper role of government in fostering economic health. State governments have been overlooked in the discussion. It's not simply a matter of what a state government *should* do (although that question has certainly been alive and well); it's what the state government can do as a matter of reality.

There has been a growing assumption that the role of any government but the federal government has been eclipsed and rendered less relevant by powerful technologies, a global economy, and the huge, overarching federal apparatus itself."

This thesis focuses on the question raised by Kanter in her second paragraph; "How much influence does Massachusetts have in determining its own national and international competitive advantage³." The short answer is probably not much in the past and certainly not much in the future if competitive advantage is determined only by macroeconomic policies (i.e. tax rates, exchange rates, tariffs, and industrial subsidies) which the state has relatively little control over nationally (i.e. with respect to other states) and certainly not internationally, where all the power resides in the federal government. However if competitive advantage can be obtained through tools which are not primarily macroeconomic in nature then the answer might be quite different.

The main crux of this paper is that state governmental efficiency problems are quite similar to those of the business, and in looking for ideas on how to approach these problems, the solutions found by business should be examined. In fact the Massachusetts government has been attempting to do this for quite some time. All of the government efficiency studies were performed by executives from private businesses. Unfortunately, not all of American firms have solved their own competitive problems, so it is little wonder that their suggestions for the government have been less than totally successful. Success is defined here as the ability to avoid the breakdown in communication which has developed between the government and the people. However one could define success as how much money has been saved, and then clearly all the efficiency studies have been successful, with the first study alone saving over 94 million dollars annually and 16 million in one time costs.⁴

Over the course of the last 15 years, the government has attempted to become more efficient. Many suggestions which seemed good have failed, and others have done quite well.

³ Competitive advantage is a term which means many different things to different academic professions. Here the term implies the ability of a state to outperform economically and socially other states, whatever the macroeconomic situation.

⁴ The Governors Management Task Force (GMTF) "A Management Plan for Massachusetts: Final Report, Implementation Progress", p. 19. 807 specific recommendations were made by the GMTF. Of these 243 were outright accepted, 300 modified, 92 under study and 172 rejected. At the time of publication, September 1977, of the 536 projects being done, 232 were finished, 225 under way, and only 79 were inactive; a quite successful project by bureaucratic standards.

The purpose of this thesis is to spell out a framework in which the governments problems can be analyzed. Many of the actions and programs resulting from the framework proposed in this paper have already been outlined in the most recent Governor's Management Task Force (GMTF), published earlier this year. Developing an analytical prospective on the problems of the state government might seem to be secondary once the actual proposals have been made. But it will be this framework will be necessary to incorporate all government offices in the successful implementation of the proposals listed in the 1990 GMTF. Only by acknowledging that the state government has to think about its problems from a different viewpoint will the state government be able to be put back in touch with the voters.

The paper starts by examining the relevant background of the problems of Massachusetts and attempts to address the critics who might think that studying government efficiency is either unimportant or a lost cause. The following chapters fill in the missing pieces and expand on the thesis argument presented below and construct the proposed framework. The final section discusses the implementation problems of any new "efficiency" plans.

Thesis Argument:

In essence the state government, the state economy, and some of the state industries are experiencing "competitive" problems. The state governments problems are extremely similar to those of industry (which have been studied extensively). The government is a provider of services, as are both manufacturing and service-oriented firms⁵. Government provides financial help, professional help, and major products (the core infrastructure: hospitals, roads, schools, etc) and thus to the citizens of this state, the government is just another business. But unlike other industries, there frequently is no competitor to go to if you do not like the service or the product and you do not have the choice to not "buy" it. The competitiveness of the state economy is a much more nebulous topic than either the competitiveness or efficiency of state government or that of Massachusetts industry for the simple reason that the economy represents a link between the two, whose nature changes over time.

In the attempt to regain some long-term competitive advantage, some American firms have decided that their fundamental approach to business had to change; that the philosophy of how business is conducted had to be rethought. The result was the formulation of the philosophy of Total Quality Management, which in its crudest form is a way of keeping track of what the customer wants, and what the company is providing, through the integration of all the business functions during the entire product cycle. The attempts that the Massachusetts state government has undertaken to straighten out its affairs, parallel exactly the early efforts used by

⁵ The distinction which has traditionally been made between these two types of firms has become very blurred, and in general not relevant to this discussion.

industry to regain lost market share. Industrial firms were not successful in following the strategy of concentrating on labor productivity, just as Massachusetts has not been successful with its efficiency studies. In both cases, improvements were made and the organizations became more efficient, but they still did not answer customer complaints.

Government problems can be split into two categories, those which deal with policy issues (how to attack the major economic and social problems of the day) and those which deal with the bureaucracy. Both of these types of problems are similar to the problems faced by industry in that they are the result of reaching the limitations of linear organizational thinking.

Traditionally major organizations view the creation of their products or services as a series of linear steps, where there is very little interaction between steps which are not next to each other in line. This is exactly the same for a government bureaucracy. The problem of policy analysis is that traditional frameworks like to break down problems into smaller, more easily analyzed sections. However, when the problems are intimately connected to each other, then the solutions to the individual parts can not be superimposed. Most of what is contained in Total Quality Management philosophy is not startling to an individual, because individuals often attack complex problems by iterating between steps and constantly reevaluating the intermediate steps: a non-linear approach to a problem. Big organizations, in an effort to become more streamlined have adopted a linear approach to problem solving which is limiting their overall success with some problems. Since the problems which face government are non-linear in nature, both in the policy arena and in the execution of these policies, Massachusetts does not stand much chance of ever really solving its problems until it adopts a non-linear way of thinking; best described by the philosophy of TQM. The most recent GMTF report, while not explicitly stating so, has in fact adopted a TQM approach to the government's problems.

The status of government efficiency both in its bureaucracy and its policy making apparatus are not secondary topics behind economic growth policies; they are the economic growth policies. For the basic reason that the competitive status of the Massachusetts economy is defined by the quality⁶ of the linkage between industry and government; as well as the competitiveness or efficiency of each of the partners. Real long-term competitive advantage in the industrial sector depends, not just on the productivity of the firms in question, but also on the productivity of the infrastructure and thus of government. In other words, government is not just linked to industry through the electorate and its regulation and trade

⁶ Quality in this case can be taken as an index consisting of consistency, ease of information flow, mutual respect, respect for employees and environment, understanding that several different need have to be fulfilled by all parties involved: workers employers and the state, etc.

policies; but also through the amount and quality of the infrastructure. By rethinking how it can manage itself better, government will not only develop the skills that it needs, but will also be better to confront the questions of what it should do. In industry the manufacturing arm of a firm can be used as a competitive weapon, so can the bureaucracy of a government. By adopting a TQM philosophy Massachusetts government will be better able to serve its citizens and its industry; and the instillation of such a philosophy throughout government must be high on the priority list if the government really wants to create a competitive environment for its industry, and if it is to have a chance at solving the tough social problems which presently confront the legislature.

Paper Outline and Definitions:

This paper is organized into two main sections and an appendix. The first section outlines the problems which face Massachusetts by outlining in the first chapter why the state government should be studied, and why it should be studied in a "competitiveness" framework. The second chapter addresses one aspect of Massachusetts' problems by discussing the role of the state government in more depth. The second section develops the Total Quality Management (TQM) framework proposed by drawing parallels between government and business and examining the linkages between these two entities which create the state economy in the third chapter; and expands into the role that TQM has played in industry and how it could be used in the state government in the fourth. The final chapter of the section brings the primary thesis argument to an end by suggesting that a TQM philosophy can be thought of as an approach to problems which are non-linear in nature; both at the policy level and at the execution level. However, creating the proper policy is only ever half the battle; executing it being often were the real test of any policy occurs. And while TQM backed programs often have at their heart the idea that any plan must be executable, and much of the work in developing a true TQM program revolves around creating an executable plan, it would be folly to suggest that the state government does not have some characteristics which could make execution difficult. Thus the appendix contains specific problem areas and suggestions, which are by no means complete, but which should provide some insight onto the problems which might confront anyone implementing these proposals. The final section is a literature survey, which doubles as a bibliography, of selected readings which have contributed to this topic. Most readings are tangent to the main argument, but they provide a good cross-section of the different topics associated with this paper and are grouped alphabetically by area.

Most of the definitions used in this paper are self-explanatory. However there are a few which take some time to develop because the common definition might not seem applicable to the situation at hand. Some examples are competitiveness, or efficiency; but these are dealt with effectively latter in the paper. There is one area which could cause some confusion and

thus should be addressed here: those of the definitions of policy makers and bureaucracies when referring to the government. Throughout the paper, the part of the government which delivers services is usually called the bureaucracy while those who develop programs and policies are often referred to as the policy makers. This does not suggest that all of the people who are connected with the government fit into either of these categories, that people outside of the government are not included in these, or that they are mutually exclusive. The definitions chosen happen to be one way of viewing the state government, but it is by no means the only way, and although it has been kept to a minimum, sometimes these common terms are used in more traditional ways which should be clear from the text.

Section I The Problems Facing Massachusetts

Chapter One: Why Study the "Competitiveness" of Massachusetts State Government?

As background to the main topic, the question raised above will be discussed. This can be broken down into two separate ideas: why study State government at all (versus national or local government), and why the "competitiveness" of it. There are probably few people who would argue that government in general should not be studied, for the simple reason that a great deal of our money goes to support it. But when looking at Massachusetts in particular, it is not clear that state government is the level which needs to be studied.

The Role of Massachusetts State Government:

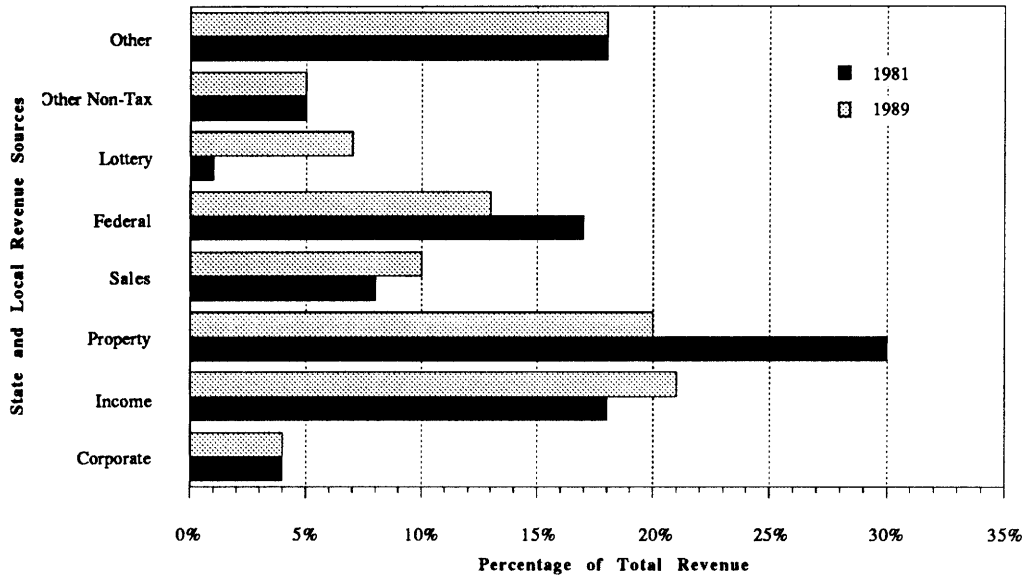
In fact there has been some recent developments which have made, in the voters minds, the state government more important than it ever was: the huge state budget, the passage of proposition 2 1/2, and the cyclical nature of the state economy. First the state budget is big, for fiscal year 1991 the governor outlined a budget of approx 12.9 Billion¹. Secondly, the total revenue structure and spending structure has changed over the last decade. In 1982 proposition 2 1/2 took effect which drastically limited the amount of revenue which could be collected through the property tax. Since this was the major source of revenues for local government, this resulted in a major change in the composition of total revenues over this decade, and as shown in figure 1-1.

First the percentage of total revenue generated by the property tax has decreased, as has the percentage contributed by the federal government, which has forced a greater reliance on the sales and income taxes and lottery revenues.²

¹ Since the final budget has not yet been passed, and once it is, some sections will undoubtedly be challenged in the November referendum, this number should only be considered an approximate figure.

² Governor's Management Task Force "Massachusetts: Managing Our Future", 1990, Volume II, Table VI-4, p. 100

Figure 1-1
Change in Local and State Revenues
From 1981 to 1989



Secondly two-thirds of total own-source revenue is collected at the state level, versus about 58% in a group of sixteen peer states³. 79% of all revenues are in the form of taxes versus fees. This makes Massachusetts the 2nd state to most use taxes versus fees of all fifty states. and of the taxes which are collected, 70% are collected by the state.⁴ However since Massachusetts revenue structure is different from other states, the best form of comparison between states is total revenue burden per 1000 \$ of personal income, which takes into account different revenue raising methods. Figure 1-2 shows that Massachusetts ranks quite low on the overall revenue burden scale.

³ Often a state is compared to a peer group to give an idea of how it is doing. This technique, while useful in some situations, probably does not help much if all states are puzzling over how to solve fundamental problems in government. With that note of caution, the peer group commonly used to compare with Massachusetts is:

High Technology: Washington, Arizona, N. Carolina, California, Maryland, and Texas

Industrial: New York, Michigan, Pennsylvania, New Jersey, and Illinois

New England: Maine, Vermont, Connecticut, Rhode Island, and New Hampshire

(Taken from the GMTF 1990 definitions)

⁴ GMTF 1990, Vol. I, p. 69

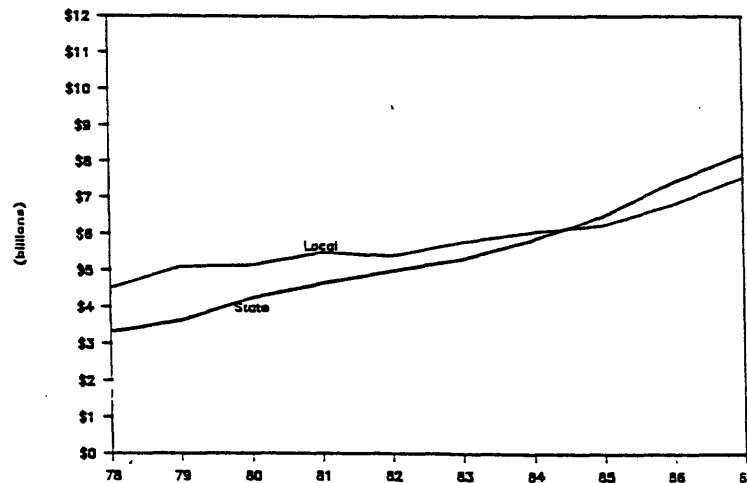
Figure 1-2⁵
State and Local Own-Source Revenues (FY 1989)
(per \$ 1000 of personal income)

| <u>High Tech</u> | | <u>Industrial</u> | | <u>New England</u> | |
|------------------|--------|-------------------|--------|--------------------|--------|
| Arizona | \$ 178 | New York | \$ 206 | Vermont | \$ 183 |
| California | 167 | Michigan | 166 | Maine | 173 |
| Washington | 160 | New Jersey | 149 | Rhode Island | 150 |
| Texas | 156 | Pennsylvania | 145 | Massachusetts | 143 |
| Maryland | 154 | Massachusettsa | 143 | Connecticut | 136 |
| North Carolina | 151 | Illinois | 140 | New Hampshire | 115 |
| Massachusetts | 143 | | | | |

16 State Average \$ 158
U.S. Average \$ 161

A third issue has been which level of government spends the most. Figure 1-3 shows state and local direct spending, which does not include the local aid provided by the state government (approx 28% of the state governments FY 1991 budget⁶). State government surpassed local government in the value of the direct services offered during 1984. If local aid is included the state replaces the local government as the primary spender much earlier.

Figure 1-3⁷
State and Local Direct Spending



⁵ GMTF 1990, Volume II, Table VI- 11, p. 107

⁶ Massachusetts Taxpayers Foundation, State Budget Trends: An Analysis of the Governor's Fiscal 1991 Budget Submission, April 1990, , p. 6

⁷ Massachusetts Taxpayers Foundation, State Budget Trends 1981-1990: Revenues and Expenditures. The Gap Widens, April 1989, p. 3 (State spending excludes local aid)

As an examination of what the taxpayer actually receives from having the state do most of the service providing and tax administration one can look at what might be considered the "bottom line", how has Massachusetts employment been. Figure 1-4 shows Massachusetts annual employment growth along with the actual employment level. Figure 1-5 shows the U.S. and Massachusetts employment growth rates plotted together. As one can see from figure 1-5, the traces are almost identical. This would tend to make one suspicious of the idea that a state has any real control over its economic condition. This can, and perhaps has, contributed to a general lack of faith in Massachusetts government.

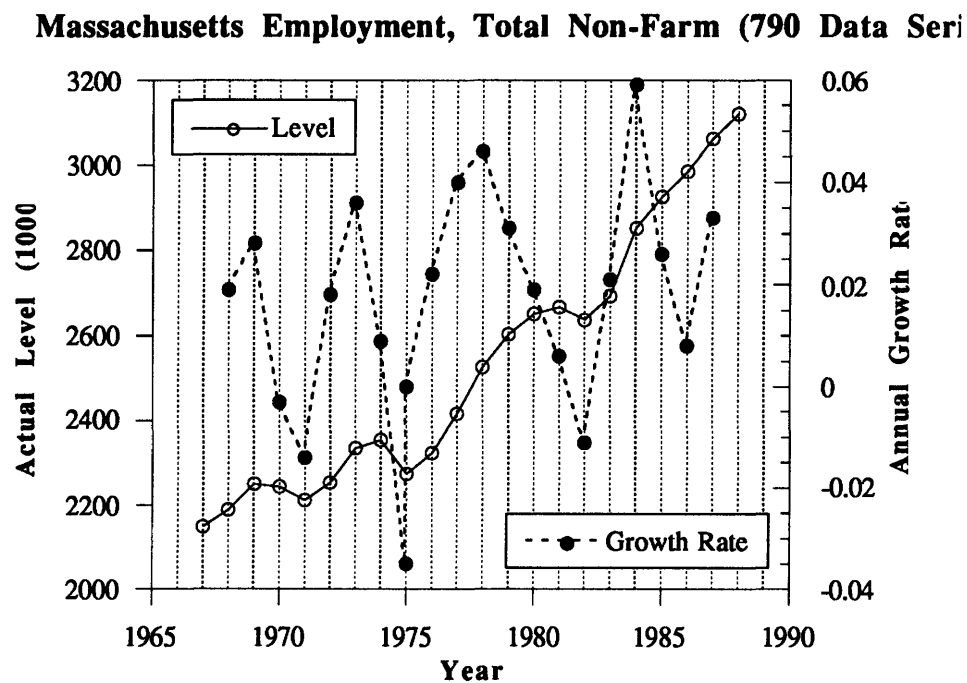


Figure 1-4⁸

⁸ Massachusetts Level Data from the Handbook of Labor Statistics, U.S. Dept. of Labor, August 1989, Bulletin 2340; tables 86-88., March 1988 Benchmark. Growth rates calculated on a yearly basis from this data

Annual Growth for Total Non-Farm Employment (790 Data series)

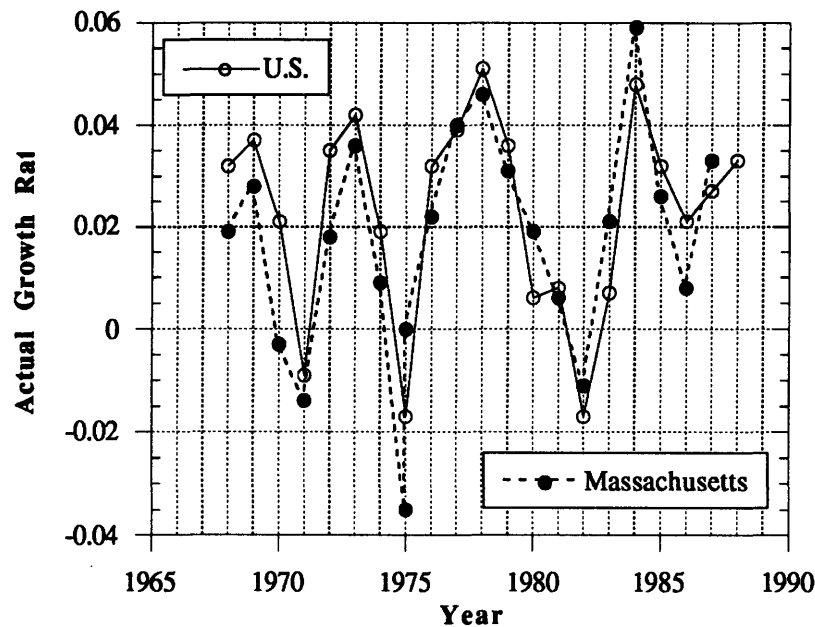


Figure 1-5⁹

As a final reason for studying state government, new work has been published which suggest that the level of public capital investment plays an important role in overall industrial productivity. This topic was first analyzed in depth in 1989, and will surely become one of the hot issues for government in the future. As a result some time will be taken to discuss this idea.

The Role of Public Capital:

The argument is simple: private firms use some technology, labor, and capital to transform raw materials into goods, but before the good reaches the customer, the firm will have also used some amount of public capital. This is easily seen if one considers the example of a trucking firm which utilizes the road system to make deliveries. A good straight, well maintained system makes shorter trips with less wear on the trucks, contributing to lower costs. However, the argument can be expanded to social institutions as well, such as an operating legal system, or a good school system. In the latter case, good school systems provide employers with people who can think and make recommendations for how to improve the business. By expanding the argument, almost all of our social institutions or government

⁹ Handbook of Labor Statistics, Bull. 2340, Table 68. March 1988 Benchmark

programs can be said to help businesses, the question becomes at what cost to other business and society in general.

Munnell¹⁰ investigated the link between public capital , labor productivity, multifactor productivity and output growth¹¹. As she points out the traditional way of estimating multifactor productivity arises from the estimations of the production function shown in equation 1.¹²

$$\text{Output (t) = Multifactor Productivity (t) * a function of capital and labor. Or} \\ Q(t) = \text{MFP}(t) * f[K(t) ,L(t)] \quad (1)$$

where Q(t) is real output

MFP(t) is multifactor productivity which is usually taken as a measure of technology growth

K(t) is Capital (Private generally)

and L(t) is labor

Differentiating equation 1 with respect to time creates an equation based on percentage change over time:

$$\%Q \text{ Growth} = \%MFP \text{ Growth} + S_l(\% L \text{ Growth}) + S_k(\% K \text{ Growth}) \quad (2)$$

where S_l and S_k are the output elasticities of the factor inputs

Since Q, L, and K are measured quantities MFP can be calculated by inverting equation 2

$$\%MFP \text{ Growth} = \%Q \text{ Growth} - S_l(\% L \text{ Growth}) - S_k(\% K \text{ Growth}) \quad (3)$$

Labor Productivity is by definition the difference between growth in output and growth in labor input:

$$\%Q \text{ Growth} - \% L \text{ Growth} = \%MFP \text{ Growth} + S_k(\% K \text{ Growth} - \% L \text{ Growth}) \quad (4)$$

since $S_k + S_l = 1$

figure 1-6 shows the the different annual growth rates of these terms based on business cycles as collected by Munnell.

¹⁰ Munnell, Alicia "Why has Productivity Growth Declined? Productivity and Public Investment" in New England Economic Review, Jan-Feb 1990, pp 3-22.

¹¹ These topics are discussed in more detail latter in the chapter. For a more theoretical discussion see any of the Bureau of Labor Statistics pamphlets on multifactor and labor productivity definitions.

¹² Munnell, p 5.

Figure 1-6
Average Annual Percentage Change in Output, Factor Inputs and Productivity
Ratios for Private Nonfarm Business, Selected Periods¹³

| Column Period | Output | Labor Measures | | Capital Measures | | Multifactor Measures | |
|------------------|--------|----------------|-----------------------|---------------------------|-------------------------|----------------------------|-----------------------------|
| | | Labor Input | Labor Productivity | Capital Labor Ratio | Capital Productivity | Capital- Labor Input | Multifactor Productivity |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | Col 1- 2 | | | Col 2 + 5 | Col 1- 6 |
| 1948-87 | 3.3 | 1.4 | 1.9 | 2.1 | 0.7 | 2.2 | 1.1 |
| 1948-69 | 3.8 | 1.2 | 2.5 | 2.1 | 0.7 | 2.0 | 1.8 |
| 1969-87 | 2.8 | 1.6 | 1.1 | 2.1 | 0.7 | 2.4 | 0.4 |
| 1948-60 | 3.3 | 0.8 | 2.5 | 2.1 | 0.7 | 1.5 | 1.7 |
| 1960-69 | 4.5 | 1.9 | 2.6 | 2.1 | 0.7 | 2.6 | 1.8 |
| 1969-79 | 2.9 | 1.8 | 1.1 | 2.1 | 0.7 | 2.5 | 0.4 |
| 1979-87 | 2.7 | 1.4 | 1.2 | 2.2 | 0.8 | 2.2 | 0.4 |
| 1948-53 | 4.6 | 1.4 | 3.2 | 1.9 | 0.7 | 2.0 | 2.5 |
| 1953-60 | 2.4 | 0.4 | 2 | 2.3 | 0.8 | 1.2 | 1.2 |
| 1960-69 | 4.5 | 1.9 | 2.6 | 2.1 | 0.7 | 2.6 | 1.8 |
| 1969-73 | 3.6 | 1.5 | 2 | 2.7 | 0.9 | 2.4 | 1.1 |
| 1973-79 | 2.5 | 2.1 | 0.5 | 1.7 | 0.6 | 2.6 | -0.1 |
| 1979-87 | 2.7 | 1.4 | 1.2 | 2.2 | 0.8 | 2.2 | 0.4 |

Munnell points out that the production function listed in equation 1 does not take into account the public capital. In 1987 total private non-farm business accounted for 61% of the total capital stock, the military 7% and the public non-military 29%¹⁴. Figure 1-7 shows the growth of the different capital stocks over the periods in question.

¹³ Munnell, Table 1 p, 9.

¹⁴ Munnell, Table 3, p. 14

Figure 1-7
Average Annual Percentage change in the Real Value of Private and Public Capital Stock¹⁵

| Period | Output | Labor Input | Private Capital Total | Public Capital | | Non-military | | |
|---------|--------|-------------|-----------------------|----------------|----------|--------------|------|-------|
| | | | | Capital Total | Military | Total | Core | Other |
| 1948-87 | 3.3 | 1.4 | 3.7 | 2.4 | 0.9 | 3.0 | 2.8 | 3.3 |
| 1948-69 | 3.8 | 1.2 | 4 | 3.0 | -0.1 | 4.1 | 3.7 | 5.0 |
| 1969-87 | 2.8 | 1.6 | 3.3 | 1.7 | 2.1 | 1.6 | 1.7 | 1.4 |
| 1948-60 | 3.3 | 0.8 | 3.7 | 2.4 | -0.5 | 3.7 | 3.3 | 4.5 |
| 1960-69 | 4.5 | 1.9 | 4.4 | 3.7 | 0.4 | 4.7 | 4.2 | 5.5 |
| 1969-79 | 2.9 | 1.8 | 3.6 | 1.7 | 0.1 | 2.1 | 2.0 | 2.3 |
| 1979-87 | 2.7 | 1.4 | 3 | 1.6 | 4.8 | 1.0 | 1.3 | 0.3 |
| 1948-53 | 4.6 | 1.4 | 3.9 | 1.4 | -2.2 | 3.2 | 2.7 | 4.4 |
| 1953-60 | 2.4 | 0.4 | 3.6 | 3.1 | 0.7 | 4.1 | 3.8 | 4.6 |
| 1960-69 | 4.5 | 1.9 | 4.4 | 3.7 | 0.4 | 4.7 | 4.2 | 5.5 |
| 1969-73 | 3.6 | 1.5 | 4 | 2.1 | -0.9 | 2.8 | 2.6 | 3.1 |
| 1973-79 | 2.5 | 2.1 | 3.3 | 1.5 | 0.7 | 1.6 | 1.6 | 1.8 |
| 1979-87 | 2.7 | 1.4 | 3 | 1.6 | 4.8 | 1.0 | 1.3 | 0.3 |

Munnell contends that in reality, the production function listed in equation 1 should include a separate term for public capital:

$$Q = MFP * f(K, L, G) \quad (5)$$

where G stands for public capital

The resulting equation¹⁶ :

$$\%Q \text{ Growth} - \%L \text{ Growth} = \%MFP \text{ Growth} + a (\%K \text{ Growth} - \%L \text{ Growth}) + b (\%G \text{ Growth} - \%L \text{ Growth}) \quad (6)$$

where a and b are to be estimated and the last term can be interpreted as public capital growth. Using this approach, Munnell estimated multifactor productivity and its contribution to labor productivity.

¹⁵ Munnell, Table 4, p. 15

¹⁶ Actually she tried several different assumptions, this is just one of them, but turned out to be the most successful, p. 16-17

Figure 1-8
Re-estimated Multifactor Productivity¹⁷

| | Output | Labor Productivity | Modified Multifactor Productivity | Difference Due to Public Capital |
|---------|--------|-----------------------|---|---|
| | 1 | 2 | 3 | Col 2- 3 |
| Period | | | | |
| 1948-87 | 3.3 | 1.9 0 | 1.1 | 0.8 |
| 1948-69 | 3.8 | 2.5 | 1.2 | 1.3 |
| 1969-87 | 2.8 | 1.1 0 | 0.9 | 0.2 |
| 1948-60 | 3.3 | 2.5 | 1.2 | 1.3 |
| 1960-69 | 4.5 | 2.6 | 1.4 | 1.2 |
| 1969-79 | 2.9 | 1.1 | 0.8 | 0.3 |
| 1979-87 | 2.7 | 1.2 0 | 0.9 | 0.3 |
| 1948-53 | 4.6 | 3.2 | 2.3 | 0.9 |
| 1953-60 | 2.4 | 2 | 0.3 | 1.7 |
| 1960-69 | 4.5 | 2.6 | 1.4 | 1.2 |
| 1969-73 | 3.6 | 2 | 1.4 | 0.6 |
| 1973-79 | 2.5 | 0.5 | 0.4 | 0.1 |
| 1979-87 | 2.7 | 1.2 | 0.9 | 0.3 |

There are several interesting points. First a great deal of the growth of labor productivity which occurred in the period 1948-69 had been attributed to multifactor productivity (1.8 of the 2.5 growth) when in reality multifactor productivity only grew at 1.2%. The 1.4% decline in labor productivity that was observed occurring from the 1948-69 period to the 1969-87 period has only a .3 component due to a decline in multifactor productivity, the rest, 1.1 percent decline is due to a fall in the public capital-labor ratio. Munnell states that this ratio which grew at an annual rate of 2.9% for the 1948-69 period virtually stopped growing after 1969.¹⁸ In other words, the extraordinary growth which was observed in the first period was due to a build up of public capital, and the decrease in labor productivity can be traceable to the decline in public capital growth.

Munnell currently estimates that the shortfall in public investment decreases labor productivity by between .1 and .2 percentage points. By increasing the growth in public spending to the level of the growth of labor would reduce this to zero. Increasing investment in public capital so that the public capital-labor ratio increases by 1 percentage point annually

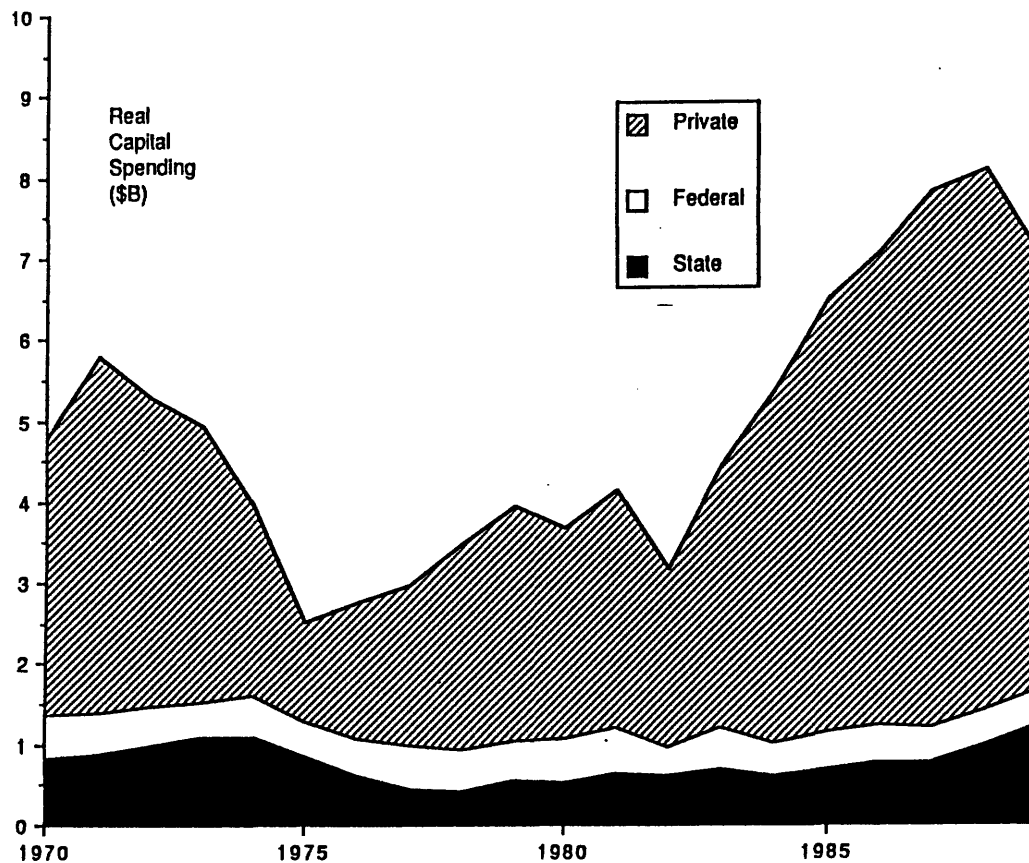
¹⁷ Munnell, Table 8, p. 19 option B

¹⁸ Munnell, p. 20

could increase labor productivity by 1.7 percent. Investing to the point where the public capital-labor ratio is the same as the private capital labor ration could cause labor productivity to grow by 2.1 percent.¹⁹

This work has implications for the role of state government in private productivity since most of the major infrastructure generation is done at the state level (whether the funding comes from the state or from the federal government). More econometric studies need to be performed to estimate the actual role that the decline in public investment has had on both the nations and Massachusetts competitiveness. However it is clear from figure 1-9 that the decline in public capital spending which was present throughout the country existed in Massachusetts as well.

Figure 1-9²⁰
Private and Public Capital Spending in Massachusetts
1970-1989 (Real 1989 Dollars)



¹⁹ Munnell, p 20

²⁰ GMTF 1990, Volume II, Table V- 17, p. 92

This bombardment of facts should provide the basis for why Massachusetts state government should be studied, now the question of why study the "competitiveness" of state government. The best way to start is probably by defining what competitiveness means in the context of state government.

Why Study the Competitiveness of State Government:

The definition of national competitiveness which is most widely used comes from the Presidents Commission on Industrial Productivity.

"Competitiveness is the degree to which a nation can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining and expanding the real income of its citizens"²¹

This definition, as pointed out by Lenz²², contributes in two ways to understanding the problem. The first is the idea of free and open markets which eliminates possible government actions such as trade restrictions and voluntary restraint agreements as possible fixes. Actions such as these could seem to improve the competitive position of the industries affected by basically removing their competition and shouldering the costs of inefficiency onto the consumer. The second part is the condition that all actions must expand the real income of its citizens. Thus, the policy of dramatically reducing the value of the dollar, which would make goods competitive internationally but which would impoverish the nation would not be a viable solution. In addition this second condition points to a time dependence; that present competitiveness cannot be paid for by future wealth. A corollary is that a truly competitive nation (or industry) is one that is competitive over a long time horizon and not just for a specific set of economic conditions. Interestingly, if a definition of national competitiveness contained any of the elements listed above, then the definition could not be applied to a state government. Most of these topics are macro-economic in nature and are controlled by the federal government. It should be clear that the increase in the total wealth of a nation is linked to the growth of some type of productivity measurement. How fast the national wealth grows is an aggregate measure of its competitiveness. But what does competitiveness mean when looking at a state.

²¹ As reported in Allen J. Lenz's article "U.S. International Competitiveness; Conceptual and Measurement Problems" in United States Trade: Performance in 1985 and Outlook by the International Trade Administration, U.S. Dept. of Commerce; October 1986 p. 98

²² Ibid

The state can, as the national government can, create policies which encourage growth in labor productivity or capital productivity, but there are other measures of competitiveness at the state level which one should be concerned with. Are there many different types of jobs for people with different skills? How does the standard of living compare with other states? As an example, Massachusetts has been referred to as an expensive place to obtain cheap labor, but a cheap place to get expensive labor²³, implying that this state has a natural advantage in attracting business which employ one type of worker, but not another. All states have some natural advantages and disadvantages, one measure of competitiveness for a state could be the ability to attract the businesses which would perform well in its environment. The definition of national competitiveness used earlier can be modified to reflect the dual nature of the competition that states face: from other states and from other countries.

State competitiveness is the degree to which a state can, under free and fair market conditions, produce goods and services that meet the test of international and national markets while simultaneously maintaining and expanding the real income of its citizens, without transferring the costs of that expansion to other areas of the nation.

This definition has similar implications as the national one. Perhaps the only part which might be unclear is the last, which has been added to make sure that one state does not expand its real income by politically transferring the costs of expansion to another state²⁴.

The question still remains as to why one would use "competitiveness" as the context to study state government? Why not use efficiency or productivity. The short answer is that competitiveness is really both efficiency and productivity, but with a purpose or goal in mind. Competitiveness is an aggregate measure of how well an organization is responding to outside demands. It is entirely possible for any organization to be efficient and productive, but not competitive. By studying state government in this context, one will also be studying state government efficiency and productivity. But with the final analysis of how well government is doing will not be based just on these measures, but on how well the state is answering the needs of its constituents.

²³ Thurow, Lester in the Forward to The Massachusetts Miracle, David Lampe, Ed., The MIT Press, 1988, p. xi.

²⁴ This part of the definition focuses on an emerging, but not relevant problem, of true cost accounting. Most examples presently revolve around environmental issues. An example is one sector of the country could gain a competitive advantage by burning a lot of cheap low quality coal to generate electricity, but other parts of the country downwind would have to foot the environmental costs of such action.

The Relationship Between Efficiency, Productivity, and Competitiveness:

Throughout this paper, a great deal will be written about competitiveness in terms of efficiency and productivity and thus it is only fitting that some time be spent explaining the connections between these terms, especially since so much has been written in the business literature about these. Efficiency and productivity are topics related to competitiveness, but they are not the same, nor are they synonymous for each other. One potential way of separating the two concepts is that efficiency usually needs a qualifier, efficiency of space, of materials, of price, etc. While productivity usually refers to a ratio of input versus output for some type of input (i.e. labor productivity or capital productivity). As an example it is completely possible for a company to efficiently (use whatever qualifier you want here, space, time, money) make a product that no one wants. The company will not be competitive, but it is efficient. Also it is possible for a company to make a product quite inefficiently with low productivity, but if it is the only company that makes that product, and someone wants it, then the company is competitive. However, it will not be for long, since an inefficient company is an invitation to other companies to start producing that item. As a concluding thought, one might think that for a company to be competitive, it should also be efficient in some way, and productive; but those are not sufficient conditions to ensure competitiveness.

Lenz has shown that many of the traditional measures of either a nation's or a state's competitive position: trade and current accounts, as well as market shares, are often poor indicators taken alone; since they represent snapshots of the economic conditions at hand. While stringing many measurements together might provide better interpretations, these factors can be influenced by changes in the exchange rate and other macro-economic policies which do not readily affect industrial competitiveness. Lenz suggests the use of measures such as the savings rate of a country, the investment rate, productivity growth rates and unit labor costs as better indicators of performance. These measures, while better are not without their problems.

One particular type of measure, productivity growth rates, have been subject to much study. These generally fall into two groups, labor productivity and total factor (or multifactor) productivity. Roughly stated these are defined as:

$$\text{Labor Productivity} = \frac{\text{Total Output (GNP or NNP)}}{\text{Total Labor Input}}$$

$$\text{Total Factor Productivity} = \frac{\text{Total Output}}{\text{Weighted sum of factor inputs}}$$

each measures slightly different concepts. The first generally corresponds to welfare of people while the second is a measure of the efficiency or the technological level of the economy. Labor productivity has received a great deal of attention because in the long term the real standard of living can grow only if the overall productivity of the society grows. Labor

productivity seemed the best measure of the productivity of the society. Multifactor productivity (MFP) has gained acceptance because direct labor accounts for usually no more than 15% of direct costs in most firms, and thus MFP represents a better measure of how the overall business is being managed.

Both measures have many problems in their implementation. For instance, the number of non-production workers in manufacturing is rising, yet most labor productivity numbers include all employees in their calculations. It is possible, and has been stated, that labor productivity for production workers has continued to rise steadily but it has been the increased level of managers and support services, which do not add to the production directly, which have caused total labor productivity to decrease. Total factor productivity exhibits problems in its measurements, especially through estimation of the weighting functions and changes in output mix over time.

Wolff's article²⁵ summarizes many of the logistical problems which economists have encountered in trying to estimate changes in the competitive stature of American industries, and specifically their productivity. Some examples are:

- * Inability to include items such as environmental protection, safety, etc. in output;
- * Hard to measure capital inputs directly, money, human or technological;
- * Hard to get an accurate Weighting of labor inputs- Hard to estimate value (i.e. proper pricing index for both output and inputs; and
- * The specification of the Total Factor Productivity (TFP) function is quite difficult.

Another source of confusion in the productivity debate arises from the relative importance of growth rates and absolute levels. Since the United States economy is much larger than its competitors one would expect that its growth rate might be slower, but its absolute level higher. An example involving labor productivity is shown in figures 1-10 and 1-11.

²⁵ Wolff, Edward N. " The Magnitude and Causes of the Recent Productivity Slowdown in the United States: A Survey of Recent Studies" in Productivity Growth and U.S. Competitiveness by W.J. Baumol and Kenneth McLennan

Figure 1-10
Labor Productivity Growth in Five Countries, Aggregate and Manufacturing, Selected Periods 1950-86²⁶

| Period | France | Germany | Japan | Britain | United States |
|--|--------|---------|-------|---------|---------------|
| Growth of GDP per Hour Worked | | | | | |
| 1950-73 | 5.01 | 5.83 | 7.41 | 3.15 | 2.44 |
| 1973-79 | 3.83 | 3.91 | 3.4 | 2.18 | .8 |
| 1979-86 | 3.24 | 1.88 | 3.06 | 2.95 | 1.09 |
| Growth of Manufacturing output per hour | | | | | |
| 1950-73 | 5.63 | 6.31 | 9.48 | 3.25 | 2.62 |
| 1973-79 | 4.90 | 4.22 | 5.39 | 1.15 | 1.37 |
| 1979-86 | 3.50 | 2.78 | 5.46 | 4.28 | 3.10 |

Figure 1-11
Labor Productivity in Five Countries Relative to the United States, Aggregate and Manufacturing, Selected Periods 1950-86²⁷

| Period | France | Germany | Japan | Britain | United States |
|---|--------|---------|-------|---------|---------------|
| Aggregate economy (GDP/ hour Worked) | | | | | |
| 1950 | 39.6 | 31.5 | 13.6 | 55.9 | 100 |
| 1960 | 47.5 | 47.9 | 18.4 | 54.8 | 100 |
| 1973 | 71.4 | 68.7 | 42.6 | 65.8 | 100 |
| 1980 | 85.8 | 83.7 | 51.5 | 71.7 | 100 |
| 1984 | 95.3 | 86.1 | 54.9 | 78.4 | 100 |
| Manufacturing Output/Hour | | | | | |
| 1950 | 32.9 | 28.6 | 11.4 | 36.3 | 100 |
| 1960 | 43.8 | 48.1 | 23.2 | 36.6 | 100 |
| 1973 | 65.8 | 66.8 | 55.3 | 41.9 | 100 |
| 1980 | 82.6 | 79.6 | 75.2 | 41.1 | 100 |
| 1984 | 85.8 | 78.7 | 81.3 | 45.5 | 100 |
| 1985 | 85 | 78.7 | 83.6 | 45.2 | 100 |
| 1986 | 83.6 | 77.5 | 83.0 | 44.9 | 100 |

Indeed this is the case and this data makes three specific points which can add to the understanding of the difference between competitiveness and productivity. First of all the decrease in productivity growth during the 1970's was international in scope; secondly, the U.S maintains a superiority in absolute labor productivity, and finally growth rates for productivity in the U.S. are now as high as they were before the 1970's. If competitiveness can really be measured by labor productivity why has our industrial situation become worse since the 1970's, yet our labor productivity increased?

²⁶ Baily, M.N. and Alok Chakrabarti Innovation and the Productivity Crises, the Brookings Institution, Washington D.C., p. 5, Table 1-2

²⁷ Ibid, Table 1-4, p. 9

Several different economic studies have attempted to answer that particular question by looking at specific possibilities for the productivity slowdown during the 1970's in the hope that the information might point to specific cures²⁸. Some of the suspect causes are listed in figure 1-12²⁹:

Figure 1-12

Major Productivity Slowdown Suspects

- * Capital formation
- * Labor Force Composition and Quality
- * Energy Prices
- * Output Composition
- * Government Regulation
- * Technology Failure
- * Management Failure
- * Research and Development problems

The result of these economic studies have been summarized by Lester³⁰ and the MIT commission on Industrial Productivity as:

- 1) All studies, irregardless of methods or databases show a productivity downturn in the 1970's;
- 2) Magnitude of the slowdown varies considerably among different sectors of the economy;
- 3) There are large differences in the estimates of the importance that different economists place on the possible causes of the slowdown; and
- 4) There exists a consensus that even after all the obvious factors have been accounted for there still exists a significant portion of unexplained reduction ³¹.

²⁸ Wolff, Edward N. " The Magnitude and Causes of the Recent Productivity Slowdown in the United States: A Survey of Recent Studies" in Productivity Growth and U.S. Competitiveness by W.J. Baumol and Kenneth McLennan and Baily, M.N. and Alok Chakrabarti Innovation and the Productivity Crises, the Brookings Institution, Washington D.C. are just some examples

²⁹ Lester, Richard data from MIT Commission on Industrial Productivity research, Feb 23, 1988 course materials

³⁰ Lester, Richard From lectures on the reasoning and research of the MIT Commission on Industrial Productivity.

³¹ (60% to Denison, 20-50% by Mohr), See Wolff and Baily for more details.

To add more confusion there also appears to be an increase in both labor and multifactor productivity during the 1980's for the economy as a whole and the manufacturing sector (figure 1-13, total U.S. economy; figure 1-14, manufacturing sector).

Figure 1-13: U.S. Productivity Trends³²

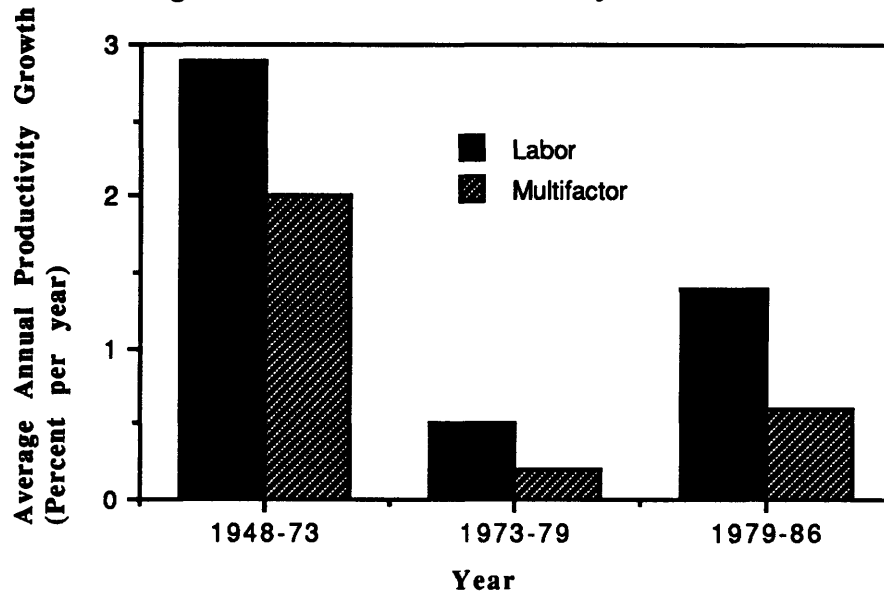
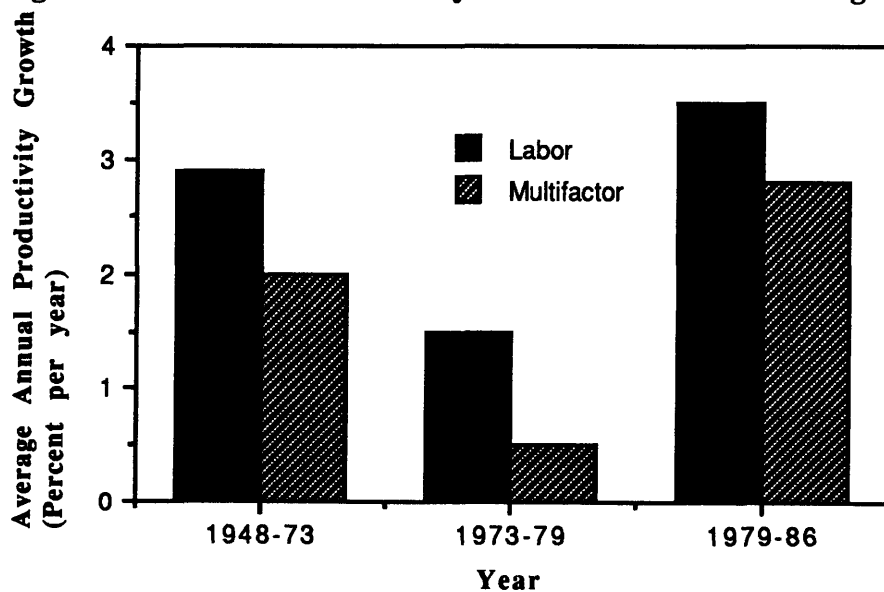


Figure 1-14: U.S. Productivity Trends in Manufacturing³³



³² Dertouzos, Lester, Solow and the MIT Commission on Industrial Productivity, *Made in America*, MIT Press, 1989 p. 27

³³ Dertouzos, p. 30

These figures as well as data presented earlier point to a resurgence in manufacturing productivity in the 1980's, but yet many American companies have continued to lose market share during this last decade. It should be clear that while different productivity measures are useful tools in establishing the competitiveness of a firm, they are not the only ones. Since the competitiveness of a state will depend to some degree on the competitiveness of its industry, it is important to keep the ideas of productivity and efficiency separate from the idea of competitiveness.

At this point it should be clear that studying Massachusetts state government is a worthwhile exercise, and that a case has been made that studying it in a competitive context is a valid exercise (although no claim has been made that it is the only way to do it). The rest of the first section deals specifically with Massachusetts government problems. It will outline the problems that exist, and why they can be categorized as being voter confidence problems. In addition it will discuss what has been learned from the past attempts at dealing with both the bureaucracy and the policy process. It will finish with a discussion of the problems which government really has to solve.

Chapter Two: The Problems Facing Massachusetts State Government

Structural Problems in Massachusetts Finances:

It is clear that the present fiscal crises which grips the state government can be interpreted as a lack of voter confidence. Possible state budgets have failed due to the concern that the Citizens for Limited Taxation (CLT), or some other activist group, will succeed in pushing through a November referendum rolling back any tax increase used to balance the budget. The state legislature has good reason to fear the political power of the CLT and the Massachusetts High Technology Council (MHTC) given their past legislative successes¹. Another test of voter satisfaction with government comes in the form of the local proposition 2 1/2 overrides, which have not been doing well at the polls lately. No matter whether the reasons are justified or not, the voters are expressing growing disinterest and distrust of both the state and local government. Voter dissatisfaction with the state government is not a new phenomenon. The referendum process, which has been used so effectively by the CLT and MHTC to curb the actions of government, was established in 1918². And the recent efforts at tax limitations and reform have their roots in the early 1970's³. In part, the local government has been pulled into the states' quagmire as a result of proposition 2 1/2. Over 70% of the local cuts resulting from prop. 2 1/2 were eventually made up by the state in new local aide. Creating a situation where local finances are dependant on state finances. Whether the state government really deserves the bad press it gets is an academic question. The fact that a significant number of voters feel that the state government is wasteful is the real problem.

A number of significant structural problems with the state finances back up the claims of this group of voters. To begin with Massachusetts' revenue mix (shown in figure I-1) is more susceptible to swings in the economic cycles than other potential mixes. Since the sales tax is focused on larger, durable good items, the state revenues suffer wide swings during economic slowdowns. The present slowdown in revenue growth is not uncommon as shown in figure 2-1⁴.

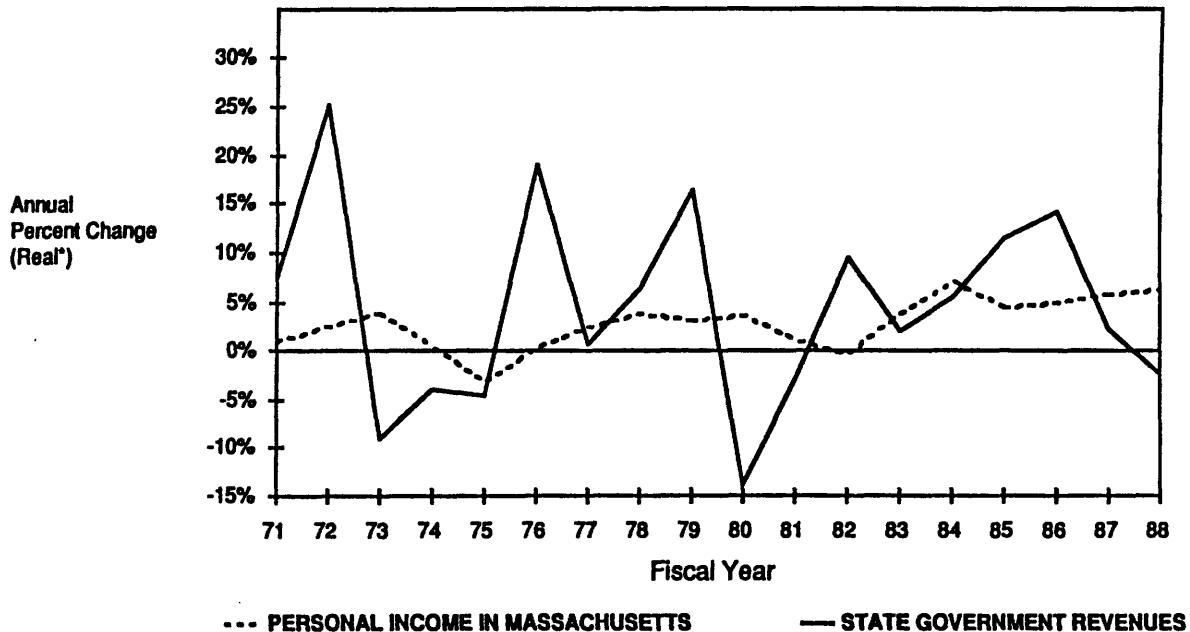
¹ Ferguson, Ronald and Helen Ladd "Economic Performance and Economic Development Policy in Massachusetts", John F. Kennedy School of Government, Harvard University, Cambridge, MA. Discussion paper D86-2, p. 92-97

² Ferguson and Ladd, p. 95

³ Ferguson and Ladd, p. 93

⁴ The Governor's Management Task Force (GMTF) Managing Our Future, 1990, Volume 1, p. 70.

Figure 2-1⁵
State Revenue and Personal Income Growth
1971-1988



*Adjusted for inflation, 1989 Dollars

**Includes all Governmental Funds - Total Revenues and Other Inflows

The declining growth in revenues would not necessarily be that complicated a problem, but when coupled with the "Structural Deficit"⁶ it becomes a crisis. The cost of maintaining the 1990 level of services in 1991 has risen by 10%, but revenues are only expected to grow by 5 to 5.5%. Every year services would have to be cut to balance the budget⁷. In addition the government is facing escalating health care costs which are rising far faster than other government costs. Actual health insurance costs for the state employees rose by 21% from 1988 to 1989 and are expected to rise by 31% by the end of 1990⁸.

⁵ GMTF (1990), Volume II, Table VI-5, p. 101

⁶ The Structural Deficit is a term used frequently by the Massachusetts Taxpayers Foundation (MTF).

⁷ Massachusetts Taxpayers Foundation, State Budget Trends: An Analysis of the Governor's Fiscal 1991 Budget Submission, April 1990, p 1-2.

⁸ Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 14.

To complicate matters, the state government is trying to balance its budget in an environment of artificially low costs, particularly in salaries for its employees. There have been a substantial number of overall staff cutbacks in the executive agencies (6% less than June of 1988 levels) and in the legislative branch (3.3% less than June of 1988)⁹, much of the help in keeping salary costs contained has been through the lack of adjustments in the pay scales. Thus there has been no pay raise for the people at the top of their pay scales, where 40% of the managers are¹⁰. All major employment contracts expired in 1989, which will force some form of negotiation soon, resulting in pay hikes (which are probably justified).

Some of the staffing cuts have undoubtedly led to "...some savings which are probably more costly than cost effective."¹¹ Specific cases involve the corrections department, where new positions for prison guards and parole officers could lead to a lower cost to the state by alleviating the overcrowding problem.¹² Or at the Department of Public Welfare where staffing reductions will force the caseload to manager ratio to over 150 to 1. The contract is for 138 to 1 and with the increase in caseload, the error rate will surely increase above its present 2.8%, possibly forcing substantial punitive federal sanctions¹³.

The Government Efficiency Studies:

It is clear that the state is facing a decline in revenue growth right at the point when major national problems in areas such as health care costs are escalating the cost of the services provided faster than revenues can be expected to grow. This is a problem which will unlikely be solved by just a tax hike. In addition some of these structural problems have been foreseen to some degree in each of the government efficiency studies done over the years. These studies are particularly interesting to investigate since they provide a snapshot not just of what the government thought its problems were, but also how they found them and what they think the solutions are. By linking these studies together, one gets an idea of how far the state has

⁹ Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 13.

¹⁰ Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 14

¹¹ Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 1.

¹² Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 1.

¹³ Massachusetts Taxpayers Foundation, State Budget Trends, April 1990, p 6. In Jan. of 1990 the DPW was the fourth largest employer in Human services, after Mental Retardation, Mental Health, and corrections; at 4087 people which represents about 11% of the Human Services employees or 5% of total state employees.

progressed in attacking its problems, and how effective the previous study was in pointing them out and proscribing remedies.

The first major study done in the recent past was the Governor's Management Task Force (GMTF) of 1975. This task force, supported by approximately 300 private organizations, analyzed the agencies in the executive branch, the state secretary, and the state treasurer¹⁴. Of the 807 recommendations generated by the private business volunteers, 536 were generated into executive agency projects by the end of 1977, with an annual savings of 94 million and a one time only savings of 16 million¹⁵. Most of the recommendations were agency specific, but throughout their review six overarching themes emerged. The GMTF concluded that:¹⁶

1) Existing organizations should be structured to improve accountability and performance. This is not just to streamline communications, but to better achieve the agencies objectives and to improve services by placing responsibility and accountability at the lowest possible level.

2) Strengthen the Cabinet secretaries by providing them with line operating and budget authority

At this time, individual agencies often do not report through the secretaries at all, sometimes going directly to the legislature for budget approvals. Making the governor deal with 300 individual agencies. The secretaries can provide a way of integrating similar programs, but they have to be given the authority to do so.

3) Redesign the present personnel system

In perhaps the most scathing criticism of any area, the GMTF labeled the present personnel system as "...[a] structure geared to the classic patronage view that a government job is a place to be- not a place to do something". With 14 different statuses and 2600 job classifications the GMTF estimates that half the workforce is improperly classified. Under the existing system up to nine months will pass before a position is filled.

"If the current atmosphere of apathy and distrust, the lack of reward for merit, the overly protective regulations and the politically inspired resistance are to be changed, there must be a sweeping reform of both the philosophies and procedures related to the personnel administration"

4) Reform the budget system

The budget is a tool for management, but in its present condition pertinent information is not being supplied, the executive agencies are often micro-managed by the legislature, and the present incremental system does not adequately generate operating goals. The entire procedure should be consolidated, and upgraded to a program budget system with a modern system for providing timely information.

5) Examine expenditures which are not controlled by revenues through the state and plan for future budgetary obligations

Specifically the federal government often has time-limits on the funds it provides, and programs such as the state pension fund have not been financed at all (approx 7.4 billion needed)

¹⁴ The Governor's Management Task Force "A Management Plan for Massachusetts", 1976. It should be noted that both the State Auditor and the Attorney General declined to have their offices reviewed

¹⁵ GMTF "A Management Plan for Massachusetts, Final Report: Implementation Progress", 1977, p 19.

¹⁶ Condensed from GMTF "A Management Plan for Massachusetts", 1976 preface

6) Computerize the data processing systems

Specifically, payroll and personnel, revenue and billing, accounts payable, and the budget and general ledger should all be computerized and linked so that time information can be passed between the agencies for more efficient operation.

By the end of 1977, when the last GMTF progress report was published, recommendations involving the first two themes were reaching completion, since these were within the realm of the executive branch to fix. The last four were undergoing reform, but since many of the actions requested needed legislative approval, they were far from completion. This study looked in depth at all the agencies within the constitutionally separate offices which participated; making specific recommendations about improving the operations in each office, as well as drawing the overall themes which were listed above. One of the interesting things to note is the variety of problems seen by the GMTF. One was a physical hardware problem (6), two were line-of-communications type problems (1 and 2), one was a personnel human resource management issue (3), one was a "software" issue (4), and the final was a problem in thinking or philosophy (5). As it turns out the problems which were the easiest to correct were (1, 2, and 6), which is not surprising given the similarity between business and government, but more on that in the next chapter.

The change in administration in 1979, brought a new GMTF but with a slightly different focus. In 1979 the focus was on four operational areas: personnel administration, data processing, financial management, and purchasing. But the GMTF also examined revenue activities and the Motor vehicle department because of their influence on all commonwealth residents. As a result the state generated 45 million in new revenue mostly through increased fees in the department of motor vehicles and in the department of revenue¹⁷.

The third study came in 1987, from the Massachusetts Taxpayer Foundation (MTF), but with a different set of reviewers. In this case, the MTF interviewed people who served at the level of administrator or budget director and who worked in agencies which are accountable to either the executive or legislative branches, in an attempt to find out what the managers thought was the problems that they dealt with on a day to day basis. The 19 people interviewed represented agencies which account for 70% of state employees and 60% of state spending. In a tribute to these people the MTF stated that "We were impressed by the respondents to our survey and by the quality and thoughtfulness of their responses. These are able people who are genuinely interested in improving efficiency and doing their jobs better; they are only looking

¹⁷ GMTF (1979) "year-end Progress report", November 1980, p. 17.

for the tools."¹⁸ The MTF focused on the three areas of budget and expenditure controls, executive-legislative relations, and personnel management, but also included open ended questions about what these managers thought was important. On the budget and expenditure controls, the managers found that the new accounting system MMARS (Massachusetts Management Accounting and Reporting System) as well as the revenue retention plan by agencies, subsidiary transfers and account consolidation have all been helpful in creating more control over specific agencies. In the executive-legislative relations department, most managers said that there still exists the ability to better streamline reporting requirements and that data can be shared in better ways. The final area of personnel management was where the most concern was generated. The payroll system PMIS is good, but some useful information is hard to extract. The legislature remains in a micro-management mode by instituting specific numbers of people within an agency and their job titles, instead of just providing an overall limit on staff or dollars. And finally the civil service system has been called the most serious impediment to the completion of the managers jobs.¹⁹

This study by the MTF is particularly interesting since it provides a framework by which the effectiveness of the previous two GMTF studies can be evaluated. Throughout the MTF study, the specific hardware which was called upon in 1975 seems to be in place and working with some measure of success. There was room for improvement, but no one is stating that either MMARS or PMIS be completely thrown out. In addition the lines-of-communication had been sorted out but the personnel issues still seem to be unresolved. Given that the state has seemed to have made a great deal of progress in the resolution of its physical internal problems, the question remains if there is anything that the bureaucracy can do or could have done to prevent or help solve the problems facing the state government now.

The MTF government efficiency study was not the last one, and in 1989 another GMTF was formed. This one takes a different tact from the previous ones by focusing on the philosophical aspects of management. As the GMTF of 1989 put it "...the need for a commitment to control, to managing change, and to invest in our future."²⁰ This study will reviewed in a later chapter because it, by analyzing the more fundamental versions of the bureaucracies problems, have in fact pushed the government into a new era, quite different

¹⁸ The Massachusetts Taxpayers Foundation "Managing Massachusetts: Insights and Recommendations toward more Efficient State Government", April 7, 1987 p. i-ii

¹⁹ The Massachusetts Taxpayers Foundation "Managing Massachusetts: Insights and Recommendations toward more Efficient State Government", April 7, 1987 p. i-vi

²⁰ The Governor's Management Task Force "Massachusetts: Managing Our Future", 1990, p. 2

from past efficiency studies. However government efficiency in operations is really only one half of the story; the other half deriving from what the government is actually trying to accomplish.

Massachusetts Policies:

As stated in the beginning of this chapter, the lack of faith shown by voters in government is due to the perceived result of government inaction. Sometimes this takes the form of government bureaucracy not handling their missions well, which was investigated in the efficiency studies; but it could also be due to the government misdiagnosing the missions to be performed. Certainly one of the direct causes of distrust of the state government is its apparent inability to influence the economic conditions within the state (as shown in the similarities between the U.S. and Massachusetts job growth patterns in figure 1-5) . Thus it is important to review some of the result of the various policy initiatives that have been tried over the years since 1975 to improve the states competitive advantage.

There are many different interpretations of the "Massachusetts Miracle". In its most basic form, it is the claim of a transformation of Massachusetts from a decaying industrial state in the mid 1970's with a high rate of unemployment and a high revenue burden, to a modern high technology employer with low unemployment rate and a lower-than average revenue burden. A great deal of attention was directed to the Massachusetts economy during the presidential campaign of 1988 since Governor Dukakis was campaigning for promotion. One of his major themes was the that government policies enacted during his tenure created the "new" Massachusetts. Between 1986 and 1988 there was no arguing with the endpoints of Dukakis' claims. Massachusetts was an industrial and fiscal basket case in 1975 and had been transformed into a much more competitive state by 1986. Figures 2-2 shows the Unemployment rate for Massachusetts and the U.S., Figure 2-3 shows the growth in personal income for Massachusetts and the U.S., and Figure 2-4 shows the total revenue burden for the period between 1979 and 1988.

Figure 2-2²¹
Unemployment Rates
Massachusetts and U.S. Average, 1972-1990

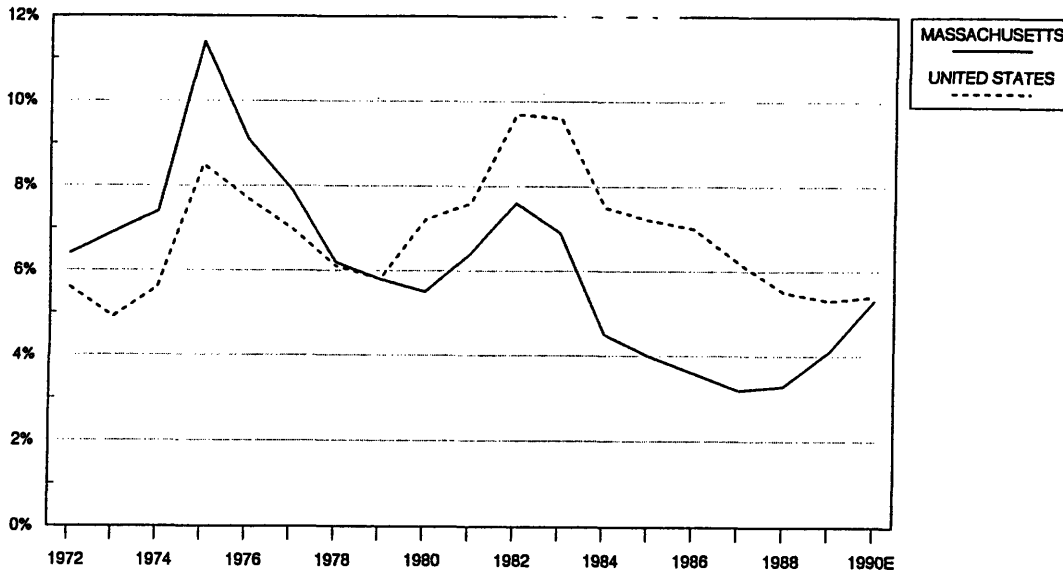
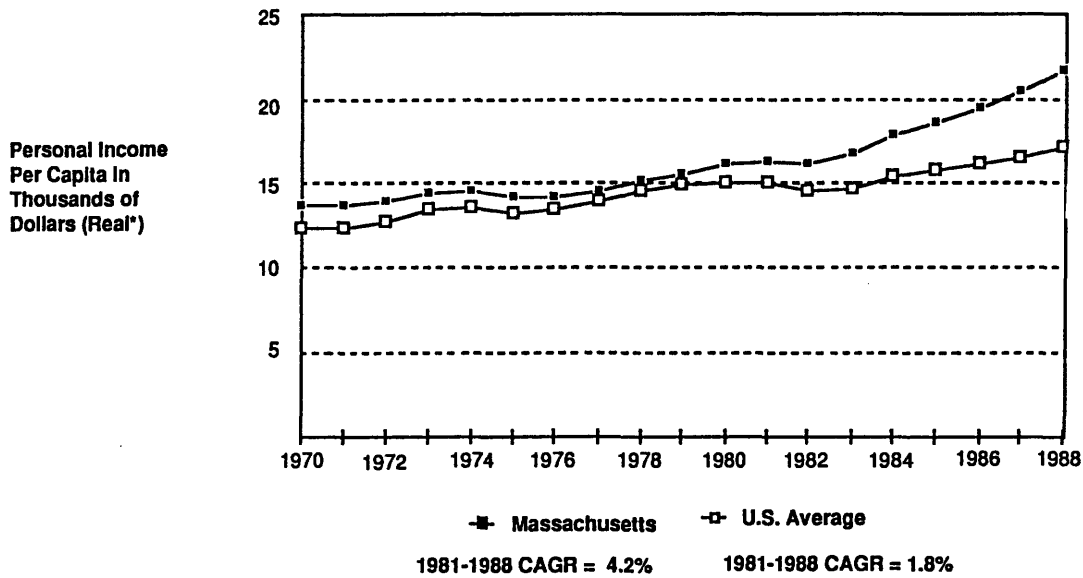


Figure 2-3²²
Personal Income Growth
Massachusetts and U.S. Average, 1970-1988

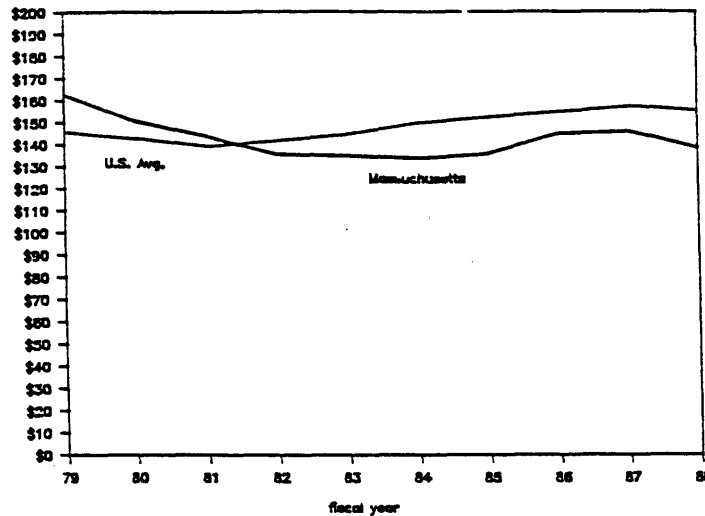


*Adjusted for inflation, 1989 Dollars - includes unearned income

21 GMTF (1990), Vol II, Table I-1, p. 3

22 GMTF (1990), Vol II, Table I-7, p. 9

Figure 2-4²³
Total Revenue Burden
(\$ per \$ 1000 Personal Income)
Massachusetts and U.S. Average, 1979-1988



While few people will argue with the end conditions, several people took exception to the idea that it was in fact Dukakis programs which made that transformation. Many people have stated that Massachusetts would be in the exact position it was in in 1988 without any help from Dukakis because of national trends, most notably the large defense build-up.

This paper will not attempt to reconstruct all the arguments in this debate, not only because the topic is immense and hotly debated, but also because it is extraneous to the central thesis proposed. What is of use is to examine some of the innovative programs that have been tried in Massachusetts to see what has been learned in some sort of conglomerated sense; since whether one is a Dukakis supporter or detractor, many of the programs installed in Massachusetts from 1975 to the present, have been the first-of-their-kinds.

There are three source which are specifically interesting for this type of analysis: Creating the Future: The Massachusetts Comeback and Its Promise for America, by Michael Dukakis and Rosabeth Kanter (1988), "Economic Performance and Economic Development Policy in Massachusetts" by Ronald Ferguson and Helen Ladd (1986), and Promoting High-Technology Industry: Initiatives and Policies for State Governments, by Jurgen Schmandt and Robert Wilson (Editors) (1987). Dukakis' book is interesting for two reasons. First it is

²³ MTF, State Budget Trends, 1981-1990: Revenues and Expenditures the Gap Widens, April 1989, p. 3

written around those points which he feels are important, thus providing an insight into how Dukakis views the Massachusetts economy. The second item of importance is his co-author, A Harvard Business school professor, who wrote separate analysis from Dukakis (Dukakis wrote some of the chapters, Kanter with her associates wrote others). The Ferguson and Ladd piece is interesting since it discusses the policies of Massachusetts from 1975 to 1986, including those of Governor King. In addition they present a shift-share analysis of Massachusetts job growth as an evaluation technique for the overall effect of public policy in that period. The last book is an evaluation of many different states programs. Thus it brings to the table a point of view which is not necessarily what did Massachusetts do for Massachusetts, but what can other state learn from the programs in Massachusetts. Luckily, all three sources focused more or less on the same programs, but with different interpretations.

The first chapter of Creating the Future: The Massachusetts Comeback and Its Promise for America, "Investment Economics and the Politics of Partnerships: Lessons from the Massachusetts Experience" written by Kanter, points two the two emerging ideas which represented a change in Massachusetts from the 1970's into the 1980's: investment economics and partnership politics²⁴. Dukakis' main goal was to create jobs and to raise the standard of living by investing in the states future in such a way that encouraged, but not replaced private investment and initiative. Kanter identified five components of this strategy²⁵:

- 1) Support the development and use of new technologies in venture that will create jobs.
- 2) Concentrate resources to create critical mass effects
- 3) Focus Investment on Neglected Areas and people
- 4) Make it easy for established firms to do business
- 5) Secure the future by Anticipating the problems of growth and solving them now

As a comparison Merrigan and Smith wrote in their chapter on Massachusetts in Promoting High-Technology... that the Dukakis administrations have focused on:²⁶

- 1) Investment in the educational infrastructure (especially at the college and graduate school level, since many firms cite the highly skilled workforce as their primary reason for locating in the state).

²⁴ Kanter, Rosabeth Creating the Future: The Massachusetts Comeback and its Promise for America, Chapter 1 "Investment Economics and the Politics of Partnership: Lessons from the Massachusetts Experience", Summit books, 1988, p. 18.

²⁵ Kanter, p 20-27

²⁶ Merrigan, Kathleen and Suzanne Smith in Promoting High-Technology Industry: Initiatives and Policies for State Governments, by Jurgen Schmandt and Robert Wilson (Editors), Westview Press, 1987, p.75-76.

2) Developing the international export side of Massachusetts business, by meeting with international leaders.

3) Investment in training and retraining its workforce.

4) Creating development financing organizations to supply capital to start-up firms

5) Reduce the overall tax burden²⁷

and to do all these items in a way which fosters communication and cooperation between the private and public sector.

One can see that the latter interpretation is a more practical guide to how one might recreate the conditions in Massachusetts somewhere else. Merrigan and Smith go on to examine four programs in depth. They have analyzed them from the perspective of what they were supposed to do, and their findings could be debated, since they often used documents published by the organization in question to support a favorable assessment.²⁸ However the question still remains as to if there is a good way to evaluate the overall effect of these programs on the economy.

Ferguson and Ladd put forward the idea of examining the changes which occurred in Massachusetts job composition as a way of evaluating overall policy effectiveness. This technique is commonly called shift-share analysis and is a residual method. By subtracting out the national growth rate of jobs in any industry from the growth rate of the same Massachusetts industry leaves a growth rate which can be attributed to something specifically happening in Massachusetts. Equation 1 represents the residual, which is often called the competitive shift as the separation of total Massachusetts job growth from the growth which would have occurred if each industrial sector within Massachusetts had grown at the national rate for that sector from year 1 to 2.

Competitive Shift in Economy₁₋₂=

{ Δ Mass. Jobs - Δ Mass Jobs if each industrial sector grew at that sectors national average}₁₋₂ (1)

²⁷ I generally agree that all the interpretations presented could be correct, except for this particular one. The reduced tax burden is almost directly a result of proposition 2 1/2 which was enacted by the voters through the referendum process when King was governor. I am not convinced that Dukakis had anything to do with this, but I am sure he took advantage of the reduced revenue burden on business.

²⁸ A particular example is in their evaluation of the Massachusetts Technology Development Corporation (MTDC) which was created to fill a capital gap which existed in the state at the time of its inception (pg. 69 of Ferguson and Ladd)). in their chapter they use as partial proof of the success of MTDC the number of jobs it says it created. Unfortunately this is a heated discussion and it is not clear that pamphlet from the MTDC should be used as proof.

This has the benefit of separating out both national trends in the entire economy and national trends which affect industries which are represented in a proportion different from the national average. While the idea is quite good (especially since the major goal of the policies was to create jobs), the execution has some problems²⁹. Ferguson and Ladd found that the overall effectiveness of the policies was not that great (Figure 2-5 shows both the authors calculations as well as those of Ferguson and Ladd. Ferguson and Ladd only had access up through 1983, but as one can see the only time there was a positive competitive shift was during the King years.

Table 2-5³⁰
Summary of Shift -Share Analysis
1967-1988
(Thousands of Jobs)

| | Total Change in Jobs in Massachusetts | | Change due to national Growth and Industry Mix Effects | | Competitive Shift | |
|----------------|---|-------|---|-------|-------------------|--------|
| | F&L | CH | F&L | CH | F&L | CH |
| | 1967-75 | | | | | |
| Private Sector | 41 | 57.2 | 257 | 268.2 | -217 | -211 |
| Public Sector | 49 | 68 | 68 | 85.9 | -19 | -17.9 |
| Total | 90 | 125.2 | 325 | 310.1 | -236 | -184.9 |
| 1975-83 | | | | | | |
| Private Sector | 392 | 413.1 | 386 | 397.2 | 5 | 15.9 |
| Public Sector | -4 | 6.3 | 25 | 29.4 | -28 | -23.1 |
| Total | 388 | 419.4 | 411 | 426.6 | -23 | -7.2 |
| 1975-79 | | | | | | |
| Private Sector | 274 | 278.8 | 353 | 363.1 | -79 | -84.3 |
| Public Sector | 21 | 51.6 | 24 | 31.3 | -3 | 20.3 |
| Total | 295 | 330.4 | 377 | 394.4 | -82 | -64 |
| 1979-83 | | | | | | |
| Private Sector | 117 | 134.3 | 29 | 31.5 | 88 | 102.8 |
| Public Sector | -24 | 45.3 | 2 | -2 | -26 | 47.3 |
| Total | 93 | 89 | 31 | 29.5 | 62 | 59.5 |
| 1983-88 | | | | | | |
| Private Sector | | 393.1 | | 494.7 | | -101.6 |
| Public Sector | | 34 | | 35.2 | | -1.2 |
| Total | | 427.1 | | 529.9 | | -102.8 |

²⁹ A more detailed analysis of the shift share results will be discussed in the final chapters. For now it can be left as that the idea is good, but the raw data is hard to obtain.

³⁰ Ferguson and Ladd, Table 3, p 27. CH data see section 3 for details

Despite the seemingly dismal performance of the policy initiatives in terms of job creation, Ferguson and Ladd point out that while the individual programs might not have caused the economic turn-around, they could have helped spread out the effects of the growth, and the process by which the programs were created helped to improve the overall business climate³¹. Throughout their analysis of the different administrations, Ferguson and Ladd have concluded that economic development policy in Massachusetts has been guided by four different ideas³².

- 1) State government should promote geographically balanced urban and regional growth
- 2) State government should make investment in human and physical capital which are in the public interest, but which are missed by private markets.
- 3) The government should support a "good business climate."
- 4) The state government should actively support the future of the state's national and international competitiveness.

Most often the necessity of the different programs enacted (such as the Bay State Skills Corp, or the Massachusetts Technology Development Corporation) has been question as well as asking if they achieved their desired objectives. Unfortunately it is always almost impossible to show wether the programs represent an optimal use of state money. But throughout the analysis, Ferguson and Ladd pointed out that the process by which the program was created, sold to the legislature, and enacted, often provided more real knowledge than the direct results of the program. This applies to those programs which were developed independently from the legislature and were approved easily, and those programs such as Massbank which failed in the legislature³³. Nowhere was this more evident than in the process of creating the better "business climate."

Academics have often been confused by what dictates a good business climate. Much empirical evidence and studies suggest that the business costs (especially taxes) imposed by the state have little impact on investment and hiring decisions³⁴. However, business leaders are almost unanimous in stating that taxes influence their decisions when most empirical research suggests that market demand, labor-management relations, and costs and access of raw materials, energy, and labor play far larger roles. In fact many firms locating in Massachusetts have stated that their primary reason for locating here was the quality of the

³¹ Ferguson and Ladd, p. 144-153

³² Ferguson and Ladd, p. 144-145

³³ Ferguson and Ladd, p 122-134

³⁴ Ferguson and Ladd, p 148.

workforce.³⁵ Perhaps this can be explained by suggesting that business leaders often use tax rates as an indicator of an overall business climate. When business leaders pointed out that they did not feel welcome in the state, and pointed towards the environmental and consumer oriented laws, taxes provide just another rallying point. While Dukakis claims to have tried to reach out to business in both terms, he often gave conflicting messages in his first term. King's approach was constantly pro-business. In his second term Dukakis tried to bring business into the policy making process, so that they are in the discussions at the beginning. And that the state is not competing with them or hampering their activities, but rather complimenting them. Thus by creating programs which were quasi-public, used small amounts of state seed money, but often had regulations which made any state action dependent on private funding as well, the state created programs which did not replace business functions but rather complemented them. By creating a system where the business leaders felt their concerns were being adequately, fairly, and consistently addressed; their major concerns over rapid changes in public policy which would cause problems for their investments, regulatory affairs or labor-management issues are alleviated. Thus Ferguson and Ladd suggest that while many of the programs created over the last 15 years might not have added huge amounts of jobs, the process of creating the programs ushered in a new era of cooperation and partnership which fundamentally helps improve the business climate of the state.

The Competitiveness Problem of Massachusetts State Government, Industry and the Economy:

If that is true, why the present problems? Looking back on both the efficiency studies and the policy initiatives one can see that Massachusetts state government, industry and the economy face a multifaceted situation. It is not just any one type of problem, management techniques or communications for example, but a combination of distinct issues which confront the state. However it is possible to group these issues into three major categories: communications, structural, and evaluation problems.

Communications encompasses the passage of information between agencies (something that the executive department has improved upon with agencies within its own branch), between different branches of government, between government and business, and between government and its citizens. All of these (except perhaps the last one) have been the subject of improvement actions, but they have never been considered as a group. It is clear that improving communications within the government makes it run more efficiently, but only if

³⁵ Merrigan, Kathleen and Suzanne Smith in Promoting High-Technology Industry: Initiatives and Policies for State Governments, by Jurgen Schmandt and Robert Wilson (Editors), Westview Press, 1987, p.73.

communications improve between the three major parties: government, industry, and the citizens, will one know if the government is moving towards a necessary and desired goal efficiently. One has seen that the process of bringing business into the policy making process early on has had a good effect on the business climate, and past experiences which involve citizens groups, the MWRA for instance, have proven to be effective. A framework is needed which specifically encourages continual improvements in communications at a levels.

Structural problems include not just the organization of the government, but also the ability to recognize and deal with the longer-term, national problems which confront the state government and its industry. Items such as health care, pension costs, the heavy industrial reliance on federal defense funding have to be examined in the context of how they can be approached and resolved without waiting for a crises to occur. Structural problems also include items such as the organization of the human resources of the state, and the budget system,

The last area is evaluation: evaluation of everything. Part of the problem is that after programs are implemented there is usually a large debate over whether the program achieved its goals. Part of the reason is that the debate on how to measure performance takes place long after the program is in place, thus major contributors to the program have special interests in the outcome. By putting the debate of the operational measures into the original proposal, this debate can take place when the vested interests are smaller in scope. In addition by reworking the budget system to become more program and milestone based, these types of debates would occur naturally and at different points in the program life. But evaluation must not just occur at the program level, but also at the agency and department level, the economic and total government level, and the industrial level. Thus one can find how efficiently any organization is running, as well as what the total contribution of all existing government programs are on the economy. In addition by stating that evaluation is important, the programs and the structure of government will be set-up with those types of measures in mind.

These three areas can be boiled down into the idea that Massachusetts government is experiencing a competitive problem, just as industry has. In fact the parallels between the government and business are extremely useful because the solutions and problems which private industry has developed in confronting its competitive problems can be directly applied to government.

Section II

The Philosophy of Total Quality Management in State Government

Chapter Three: The Parallels and Linkages Between State Government and Industry

As stated in the last chapter, the problems which presently face Massachusetts state government can be described as "competitive" in nature. In an attempt to correct these problems it makes sense to look to the literature and experience which has accumulated on the industrial competitive problem. However, while the state government is a key player in answering the question set forth in this paper, "How much influence does the state have in determining its own competitiveness", it is by no means alone. Both the health of the states industry, and the economy in general are important factors. This chapter focuses first on the parallel between government and industry and why the problems listed in the previous chapter are best viewed as being competitive in nature. Secondly it attempts to describe the relationship between government and industry and other groups which constitute the state economy and why the "economy" itself needs to be examined in a competitiveness context.

These issues lead to the fourth chapter which provide additional proof of the ideas put forward in this chapter (that Massachusetts government is similar to industry), by showing that the attempts made by industry to correct its competitive problem are similar to the ones taken by the government. And in fact much of what industry has learned can be summed up in the philosophy of Total Quality Management (TQM). After analyzing three specific business concepts which contribute to the development of TQM, the last section in the fourth chapter examines how the philosophy of TQM is represented in the the latest GMTF report and why understanding the role of TQM will be important in the implementation of the recommendations contained in the report. The last chapter of the thesis looks at how the TQM philosophy can be thought of as a solution to non-linear organization and policy analysis problems.

The Parallels Between State Government and Industry:

When an industry or a firm experiences a competitive problem, one can tell from financial statistics: lost market share, poor profits, low quality, which indicate that consumers are taking their business elsewhere. In this context there is no difference between manufacturing and service firms. Both take inputs, whether they be capital, labor or technology and provide a finished product (whether it is a service, a good, or knowledge is immaterial) which the consumer has the choice to accept or not. The government also transforms inputs (either labor, capital, or technology) into products, such as roads, police protection, libraries, etc. The only

difference is that for government there is generally no competition. At the state level one could suggest that in reality there is competition since people are free to move between states. But for many people, family and job responsibilities keep them in one area. However a competitive problem can be inferred from a lack of faith by the consumers of the government's services or its financial backers, both of which happen to be the citizens. As shown earlier in the paper, a crises of faith in the government by the voters is readily apparent in Massachusetts, and the statistics back up the claims of those voters stating that the state government is not really doing its job. The best indication of the level of faith hat the citizens have in Massachusetts government is the the use of the referendum in November. As citizen dissatisfaction with the state legislature has risen, so has the use of this procedure to directly overturn legislation. In fact the present budget problem is being held hostage, in part, to the fact that many groups have made threats to use the referendum to roll back whatever tax hikes have been approved to balance the budgets. Another sign of distrust in the government is that the candidates have tried to paint themselves as being "outside the present government".

In addition to the idea that to the citizens of a state, the government just represents another industry which takes money for services it provides (except of course the citizens have little choice in paying the money) there is a parallel between the fundamental premises which govern both industry and government. In most industries and firms throughout the world, the purpose of the firm is to maximize profit (given a set of constraints which might not just be economic)¹. This can be achieved by either maximizing revenue, decreasing cost, or some combination of the two. In government one could suggest the exact same principle holds true, except government is trying to maximize the services it provides for the lowest cost (however quite a bit of effort has been spent by the government in maximizing its revenues as well).

A third parallel which is extremely useful comes from viewing the organization of the government as similar to that of an firm. In most manufacturing firms (this is similar for service firms, although not as clear cut sometimes) different business functions such as marketing, operations, accounting, manufacturing, etc, combine to produce a product. Over the last few years much emphasis has been put on the relationship that manufacturing has had relative to the rest of the business because in the manufacturing sector, most of the competitive problems have been traced, at some stage, to quality in workmanship and cost of product.²

¹ For instance Japanese firms are often said to be more interested in market share than profits. This statement takes that into consideration by claiming that once one considers the constraint that the Japanese companies place on themselves of maximizing market share, then their objective is to maximize profit.

² This will be discussed in much more detail latter in the chapter.

Similarly the government could be viewed as being separated into different business functions with the bureaucracy which is in charge of providing the services being cast in a similar role as manufacturing. Other parts of the government, those people high in the bureaucracy which design new government programs attempting to solve some specific problem, could be classified as the product designers, and the comparison could be continued.

Modeling the government as a business is both accurate and useful. By acknowledging that the problems which face government reflect in a fundamental way a competitive problem, one can make use of the vast literature and analysis which has been done on and by industry on its competitive problems. By differentiating the parts of the government which primarily make policy from those that primarily carry it out, one can use the many different experiences which have been generated in the industrial sector relating manufacturing to the rest of the firm. In the next chapter this idea, that government can be analyzed as an industry, will be given new validity by showing that both industry and government have embarked upon similar paths in attempting to solve their own specific competitive problems.

The Definition of a Competitive Economy:

As suggested earlier in the paper, having just efficient or productive industries does not necessarily insure competitive industries. The same is true for state government. However there is an important connection between industry and government which can not be overlooked. In reality it is the competitiveness of the state economy which is directly related to the standard of living of its populace, not the competitiveness of the industry or the state government alone. The competitiveness of the economy, as shown in the first chapter, can be thought of as a measure of how well the economy is responding to outside pressures and providing increased opportunities for the populace. Thus a competitive economy means that industry and government must work together with an appreciation of each others concerns. One can have both an efficient and productive state government, but if it is not addressing the needs of its constituents which include employers and employees then it can not be competitive. This does not imply that the part of the government which creates policy has to share the same opinions as all of its constituents (clearly impossible), rather it has to provide a framework in which all concerned parties feel that their views have been thoroughly understood.

The nature of the linkages between government and industry which define the economy or the business environment have always been rather nebulous. Both state and national governments are linked to industry through three major avenues: economic, political, and social; only the first of which receives much attention. Economically, the national government is linked to the economy through taxes, international and interstate trade, monetary policy, regulation and industrial policy, and through public spending. The state government are linked

to the economy in a similar fashion except that they do not have control over monetary issues or international trade. Much analysis has been done on the economic connections and their influence on a nations competitiveness³ but little has been written about the other two paths: social and political. This is usually because when analyzing the economy most analysts think statically, not dynamically. Not only does the government influence the economy, but the economy which directly effects the standard of living of the electorate, influences the direction the government will take. Specifically it is almost imperative for a democracy to maintain a constantly growing standard of living, otherwise different political groups fight for control of ever decreasing money. Socially this leads to a situation where major social and technological problems can not be solved, ultimately leading to a crisis in the government.

It is important for all groups involved to realize the impact and connection they have with the other groups. Something cannot be good for industry and not good for that industries employees in the long run. We have seen the damage caused by toxic waste dumps which were not regulated in the past. Policies which allowed these to occur might have been good for the area for a few years, but the cost to the areas over time has been tremendous⁴. In the long run a competitive advantage can not be developed either in an industry, the government, or the economy by exploiting any particular group, whether it be the industrialists, the employees, or future generations. It can only be obtained through close cooperation between all involved in an effort to reduce the costs of the products being delivered by thinking of better ways of providing what the customer wants. Clearly there are and will be political differences which occur between groups, and thus economic differences, but as Ferguson and Ladd have pointed out, it was the process by which decisions were made, as much as the actual decisions which improved the business environment in Massachusetts. The economy can be thought of as the quality of the linkages between the different groups, or in other words the quality of the communication. Without a conscientious attention to these linkages, neither government nor industry will become competitive in the sense that it has been defined here.

³ See the literature review section for references

⁴ Love canal in western New York is a great example

Chapter Four: Total Quality Management: Its Role in Industry and Government

Manufacturing, State Government and Competitiveness:

A 1987 Harvard Business Review article¹ showed that business executives had come to the conclusion that they were both responsible for the decline in the American competitive position and responsible to do something about it. Many had come to this conclusion rather reluctantly and generally only when they were faced with unrefutable proof. This proof usually took the form of a loss in market share and/or revenue due to any of five separate causes. They were producing the wrong product or no product at all. The product that they were producing was of an inferior quality when compared to other companies. Their products cost too much. The products did not meet customer needs as well (basically they were designed poorly versus being put together poorly). And the companies were unable to take advantage of external market conditions or change to adapt to new externalities.

All of these problems had been occurring for quite some time, over several decades in fact. But probably the main shock occurred when the competition moved from making similar products which were better to making wholly new and different products which American companies could not even envision. In this case the foreign firms had experience in manufacturing technology and new products which provided them with an inherent competitive advantage since they were generating capital internally to pursue new products, plus they had moved further down the learning curve in new technologies making the next generation of products even cheaper. The most prominent example of this is the VCR and TV industries where Japanese experience with large volume production of very fine instrumentation has given them an advantage in the development of high definition television.

In the beginning of the great competitive debates, which developed when the steel mills started to close, the difference in labor rates were blamed for the problem. Then in the mid 1970's it was government pollution regulations. Somewhere in there, the idea that the decline in labor productivity was the cause of the competitiveness problem, and in fact related to the decline in the growth of real wages. Thus plant managers started to put the screws to the workers. But as Skinner² and others have pointed out this was usually to no avail.

¹ "Probing Opinions, Competitiveness Survey: HBR readers respond", Harvard Business Review, Sept-Oct 1987, p. 8.

² Skinner, William; "The Productivity Paradox", Harvard Business Review, Jul-Aug 1986, p. 55

The reason for this was that usually no more than 20% of productivity improvement comes from the results of traditional efficiency analysis. 40% comes from changes in the manufacturing process, and the last 40% comes from fundamental changes in the way manufacturing is done and how manufacturing relates to the rest of the company. Most companies have focused on the first two areas. They have tried to increase the overall company productivity by changing labor contracts, getting people to work harder and longer. In an effort to reduce the labor content of their products, many companies pursued automation strategies. Eventually this led to an examination of the process by which products are made so that more automation could be used. Typical examples of automation include the automation of design, CAD (Computer Aided Design) and automation of manufacturing through FMS (Flexible Manufacturing Systems) or CIM (Computer Integrated Manufacturing). There are many examples of companies which have tried to "buy" their way to productivity by automation, GM is a good example. But even after reducing their labor content and automating their factories, many manufactures were still not competitive. Most of the modernization programs which have failed to provide the promised productivity improvements have failed primarily because they dealt only with the symptoms of the problem, not the specific cause.

This path is exactly the one traversed by the Massachusetts state government. Of course that should not be surprising since many of the business executives who were making decisions about how their companies should become more competitive were serving on the Governor's Management Task Force. Both industry and government have focused on labor productivity, and in both cases improvements were made, but not enough to keep industry competitive, or the voters happy. Both turned to automation. Industry has tried to reduce the direct labor content of its goods, and the state government has computerized the accounting, payroll, and personnel system, both at high costs and savings but once again not enough to stay competitive.

The Development of Total Quality Management:

The answer to many companies problems came not by examining the first two areas of productivity improvement but rather the last 40% which comes from rethinking how the entire business is run. "Total Quality Management" may mean many different things to different people. In this paper it refers to the idea of examining the company as a whole and looking for long term competitive advantage by examining the manufacturing dynamics of any company. Often TQM programs revolve around the manufacturing arm of a firm. The reasons for this are historical since much of the industrial competitive problem derived from the lack of concern that American business leader have paid the manufacturing functions of their

companies over the years.³ However TQM programs could work in any area of a firm, financial, marketing, research, etc.

One way to define what TQM is would be to say what it is not. This may seem like a strange way to define an idea, but there is quite a lot of use in pointing out what TQM is not for the simple reason that many times TQM is used interchangeably with other management programs when in reality they are not related. Basically, TQM is not:

1) Automation, although automation can be tactic within a TQM program.

2) FMS (Flexible Manufacturing Systems), SQC (Statistical Quality Control), JIT (Just-in-Time), CAD (Computer Aided Design), CIM (Computer Integrated Manufacturing), MRP (Materials Requirement Plans), HRM (Human Resource Management), or any other acronym which happens to be in vogue at the time. All of these are tools, and are often used in a TQM program, but are not synonymous with TQM. It is highly likely that without a TQM program in place, the implementation of any or all of these tools will provide little benefit. TQM is a philosophy of looking at business and in its most basic form is a philosophy which states that keeping track of what the customer wants is paramount. And as such there is no one type of procedure which has the corner on being able to call itself "The only real TQM program," rather TQM becomes the framework in which the tools mentioned above operate to solve a specific business problem.

Manufacturing Strategy and the Learning Organization:

There are three ideas which form the basis of the philosophy of TQM. They are that long term competitive advantage can be obtained by creating the proper relationship between the different business functions (i.e. between manufacturing, finance, research, marketing, etc..). The idea of a learning curve exists, the more one makes of a certain product or services the cheaper it becomes through innovations in the process. And finally that it is possible to create an organization which maximizes its learning potential. These ideas force companies to view manufacturing as a competitive tool. Promoting the idea that in addition to revenues that a company receives from making a product; the ability to make that product gives the company options to pursue related products in the future.

Past papers have long pointed out the need for comprehensive manufacturing strategies⁴, however most of the strategies suggest the creation of a different role for manufacturing: as deliverer of long term competitive advantage. Many models have been put forward to try to understand how manufacturing can deliver on that promise. Perhaps one of the best models

³ Examples of this are given on pg. 40 as outlined by the MIT Commission on Industrial Productivity

⁴ Made in America, p 129-146

for understanding the relationship between manufacturing and the rest of a firm has been put forward by Hayes and Wheelwright.⁵ They suggest that manufacturing's strategic role within a company can be viewed as a continuum. At one side (stage 1) manufacturing is viewed as "Incapable of influencing competitive success. Consequently, they seek only to minimize any negative impact it may have."⁶ At the other end (stage 4) "...Competitive strategy rests to a significant degree on the companies manufacturing capability. By this we do not mean that manufacturing dictates strategy to the rest of the company but only that strategy derives from a coordinated effort among functional peers- manufacturing very much among them."⁷

In their paper, Hays and Wheelwright suggest that in reality where a company is on this continuum is determined by the net effect of all the business functions, and in fact it possible for different parts of a business to be at completely different positions along this continuum. that in effect the stages are not mutually exclusive.⁸ While new companies have some freedom in deciding where they would like to start on this continuum, it becomes almost impossible for a company to skip a stage. This is due to the natural bureaucratic inertia, but primarily since each successive stage requires the successful mastery of the skills at the previous stage to be successful.⁹ The stages on this continuum are outline in figure 4-1.

⁵ Wheelwright, Steven and Robert Hayes "Competing through Manufacturing" in Harvard Business Review, Jan-Feb 1985, pp 99-109.

⁶ "Competing through Manufacturing", p. 101

⁷ "Competing through Manufacturing", p. 103

⁸ "Competing through Manufacturing", p. 100

⁹ "Competing through Manufacturing", p. 100, 103

Figure 4-1
Stages in Manufacturing's Strategic Role¹⁰

| Stage | Title | Description |
|--------------|---|---|
| Stage 1 | Minimize Manufacturing's negative potential: "Internally Neutral" | Outside experts are called in to make decisions about strategic manufacturing issues. Internal, detailed management control systems are the primary means for Monitoring manufacturing performance. Manufacturing is kept flexible and reactive. |
| Stage 2 | Achieve parity with competitors: "Externally Neutral" | "Industry" practice is followed. The planning horizon for manufacturing investment decisions is extended to incorporate a single business cycle. Capital investment is the primary means for catching up with competition or achieving a competitive edge. |
| Stage 3 | Provide credible support to the business strategy: "Internally Supportive" | Manufacturing Investments are screened for consistency with the business strategy A manufacturing strategy is formulated and pursued Longer term manufacturing developments and trends are addressed systematically |
| Stage 4 | Pursue a manufacturing base competitive advantage: "Externally Supportive" | Efforts are made to anticipate the potential of new manufacturing practices and technologies. Manufacturing is involved "Up front" in major marketing and engineering decisions (and vice versa) Long-range programs are pursued in order to acquire capabilities in advance of needs |

¹⁰ "Competing through Manufacturing", p. 100, Exhibit 1

One aspect which is quite interesting about this model, although not pointed out in the article; is that this type of continuum could be used for any of the business functions. In fact one could have a model like this for finance or marketing. And in fact one could have a firm which was at stage three in finance but at stage two or less for other business functions. The interesting part is that in order to advance to stage four in any area, you have to be able to go to stage four in all areas. This is because there is a fundamental shift in the companies view toward its workforce has shown in figure 4-2.

Figure 4-2

Alternative Views of Work Force Management¹¹

| Stages 1,2,3. Traditional and Static | Stage 4 Broad Potential and Dynamic |
|---|--|
| Command and Control | Learning |
| Management of Effort | Management of Attention |
| Coordinating Information | Problem Solving Information |
| Direct (Supervisory) Control | Indirect (Systems and Values) Control |
| Process Stability/ Worker Independence | Process evolution/ Worker Dependence |

" In the Earlier stages the key leadership task is the management of controlled effort, but getting to stage 4 -- and prospering there -- demands instead the management of creative experimentation and organizational learning."¹²

The jump from stage 3 to stage 4 is substantial, but necessary if the company is to enter world class manufacturing status. As a final note, Hayes and Wheelwright point to four variables which can provide something of a test to see where in fact a company actually is.

Figure 4-3¹³

Hayes and Wheelwright's Test for Stage Four Placement

1) The Amount of On-Going In-House Innovation-

"Stage 4 organizations continually invest in process improvements not only because they benefit existing products but also because they will benefit future products. This is not to say that these companies are uninterested in big-step improvements, but that they place great importance on the cumulative value of continual enhancements".

2) The extent to which a company develops its own Manufacturing equipment-

¹¹ "Competing through Manufacturing", p. 104

¹² "Competing through Manufacturing", p. 104

¹³ "Competing through Manufacturing", p. 105

"The typical stage 3 operation continues to rely on outside suppliers for equipment development. A stage 4 company wants to know more than its suppliers about everything which is critical to its business. It may continue to buy much of its equipment, but it will also produce enough internally to ensure that it is close to the state-of-the-art in equipment technology."

3) The attention paid to manufacturing infrastructure-

"Stage 4 managers take care to integrate measurement systems, manufacturing planning, and control procedures, and work force policies in their structural decisions on capacity, vertical integration, and the like. They do not necessarily give infrastructure and structural elements the same weight, but they look on both as important, and complementary, sources of competitive strength."

4) The Link between product design and manufacturing process design-

In stage 3 companies the emphasis is on reducing the rework which is necessary between design and manufacturing. " ... in stage 4 the emphasis is on the parallel and interactive development of both products and processes."

Throughout the model listed above, the stages are differentiated by how well the organization can learn. One of the original tools which made use of this type of group learning was the idea of a learning curve. In the next few paragraphs the traditional learning curve theory will be expanded to include some newer ideas which relate learning to the quality of the product, and thus are necessary for both our understanding of TQM methods and how they can be applied to government organizations.

The idea of the learning curve or some of its close neighbors, the experience curve for example, is relatively simple. That either the manufacturing costs (or total costs, depending on how you define your problem) decline by a certain percentage every time the volume of products produced is doubled. Thus if an industry generally claims that its products operate on a twenty percent learning curve, then if the unit cost was 1\$/unit at the 1 millionth unit then at the 2 millionth unit it should cost .8 \$/unit. The idea of the learning curve surfaced in 1954 in the Harvard Business Review with refinements in 1964¹⁴. However criticism of the learning curve has surfaced, not so much from the idea that such a curve exists, but rather from its use as a strategic management tool. In their article, Abernathy and Wayne¹⁵ pull managers that rely solely on this phenomenon to provide their competitive advantage back to earth by claiming that 1) the learning curve is empirical in nature, there is nothing which suggests that any product has to follow any particular learning curve level. 2) That how the organization is

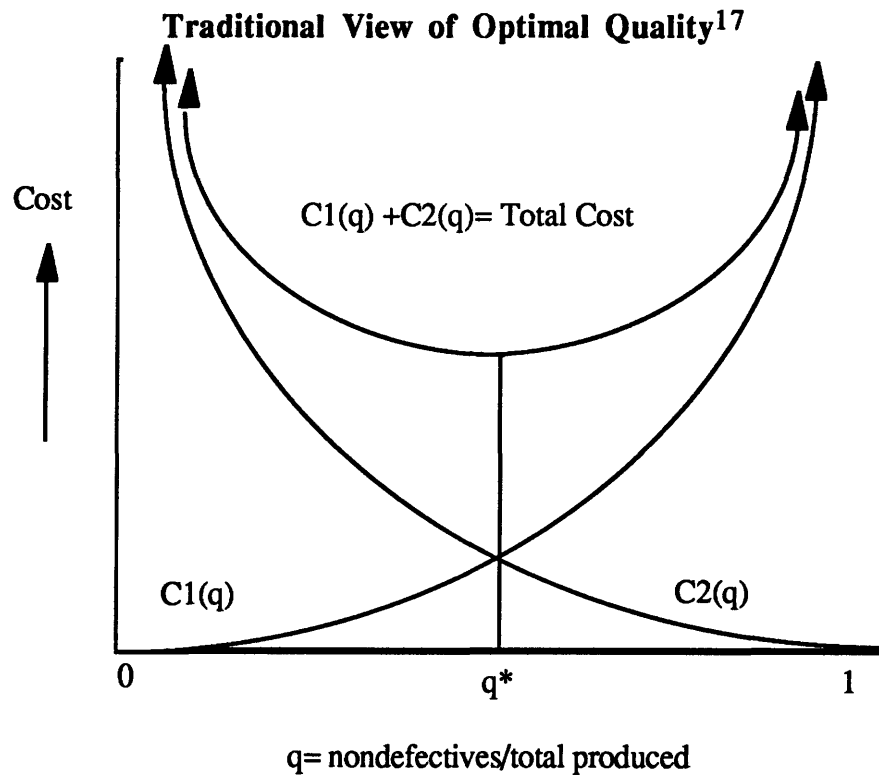
¹⁴ Andress, Frank "The Learning Curve as a Production Tool", The Harvard Business Review, Feb. 1954 and Winfred Hirschmann "Profit from the Learning Curve", The Harvard Business Review, Jan-Feb. 1964

¹⁵ Abernathy, William and Kenneth Wayne "Limits of the Learning Curve", The Harvard Business Review, Sept-Oct 1974, p.109-119

set up to learn, determines the percentage rate of the learning curve. In addition they question whether in reality there is a practical limit to the learning curve. that in reality the costs do not keep dropping as the volume is doubled. In addition they are concerned that the strategy which tries to make use of the learning curve out at its trailing edge might create an organization which is resistant to fundamentally new process or product improvements which might bring about a more substantial competitive advantage.¹⁶

A seemingly unrelated topic to the learning curve has been the idea that an optimal quality level for products exists. The traditional view is shown in figure 4-4.

Figure 4-4



$C1(q) = \text{Appraisal and prevention Costs}$
 $C2(q) = \text{Failure Costs}$

In this model the failure costs ($C2$) are assumed to approach zero as the total number of defects go to zero. However, as the cost of finding potential problems ($C1$) and fixing them goes to infinity as one tries to eliminate all possible failure modes. Thus the Total cost curve is

¹⁶ Abernathy, William and Kenneth Wayne "Limits of the Learning Curve", The Harvard Business Review, Sept-Oct 1974, p.11

¹⁷ Fine, Charles "Quality Improvement and Learning in Productive Systems" Management Science, Vol. 32 no. 10, Oct. 1986, p.1302

decreasing until some level q^* is reached. After this point, total costs start to increase and thus trying to achieve a larger percentage of error free products is not economically justifiable. As Fine points out in his article¹⁸ this idea is in direct opposition to both empirical evidence which supports the idea that higher quality goods can be cheaper, and the claims of people such as Crosby and Deming that zero-defects is always the optimal quality level.¹⁹ To resolve this paradox Fine has proposed a model which focus not on a static problem as listed above, but rather a dynamic problem of how learning actually occurs within an organization. And thus how obtaining high quality products encourage a steep learning curve.

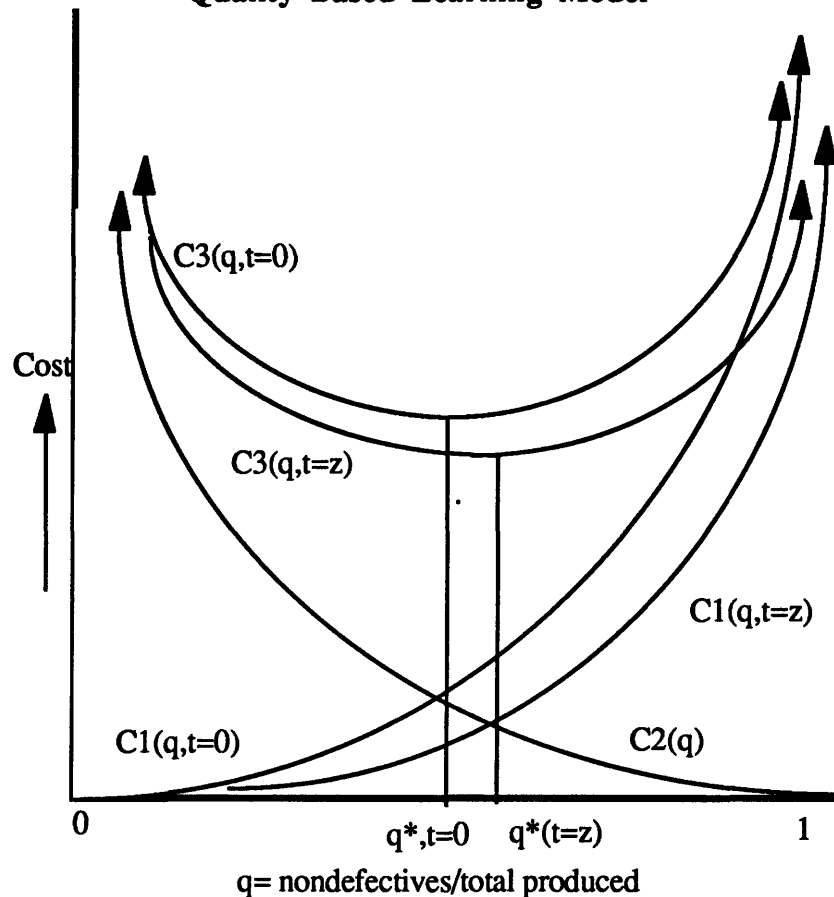
The basic assumption in Fine's model is that "quality-based learning benefits lead to a reduction in the appraisal and prevention expenditures required to attain any given quality level. That is, the learning benefits accrue in the appraisal and prevention activities."²⁰ Thus in Fine's model there is a time dependance not seen in the earlier one.

¹⁸ Fine, Charles "Quality Improvement and Learning in Productive Systems" Management Science, Vol. 32 no. 10, Oct. 1986, pp. 1301-1315

¹⁹ "Quality Improvement and Learning in Productive Systems" p.1301. In addition, Quality as defined in this section refers to the ability to manufacture what was designed. It does refer to the overall desirability of the actual design itself.. As Fine points out in pg. 1303 there has been a great deal of empirical evidence collected, throughout a wide variety of industries that even after accounting for wage and capital investment differences, the Japanese do seem to have higher quality and lower unit costs.

²⁰ "Quality Improvement and Learning in Productive Systems", p. 1309.

Figure 4-5
Quality Based Learning Model²¹



- $C1(q,t=0)$ Appraisal and Prevention costs at time $t=0$
- $C2(q)$ Failure costs at all times
- $C1(q,t=z)$ Appraisal and Prevention costs at time $t=z$
- $C3(q,t=0)$ Total costs at $t=0$
- $C3(q,t=z)$ Total costs at $t=z$
- $q^*(t=0)$ Optimum quality level at $t=0$
- $q^*(t=z)$ Optimum quality level at $t=z$

Based on his initial assumptions, Fine explicitly solves the resulting maximization problem using Calculus of Variations²². His major contention is that one can show that over time, if the interest rate is positive, that the optimal quantity path (i.e. the value of q^*) will increase and that the optimal level will always be greater than the short-run result (i.e. firms will always move towards greater quality levels). Thus this model provides the connection

²¹ "Quality Improvement and Learning in Productive Systems", p. 1310.

²² Readers interested in the explicit proof of his model and his conclusions are asked to refer to his article, since a reproduction of the proof would distract from the major points that he makes.

which is necessary for high quality, low cost products. As the quality of a product increases, its costs/unit decrease.

Total Quality Management:

The ideas listed above have all revolved around the ability of the organization to learn. In fact Total Quality Management could also be called Optimizing the Learning Organization. There are at least three major sub-philosophies which are often present within TQM programs (and are sometimes used, mistakenly, as interchangeable with TQM). Those of Deming, Juran and Crosby. Often the "Japanese system is considered a fourth²³. They generally focus on slightly different aspects of quality control from the use of communications both within a company to find a problem, and to the customer to see how the company is doing, to tight statistical control of the process, or the specific evaluation of what quality actually costs.

In general the different sub-philosophies can be amalgamated into one idea of TQM by focusing on the fact that a TQM philosophy is:

- 1) A way of keeping track of what the consumer wants, and what the company is providing, and
 - 2) A way of incorporating different technologies and business functions to obtain higher quality goods and better designed goods, in a shorter time span, more reliably and cheaper.
- To continually focus on these ideas, TQM backed programs have four major guidelines:
- 1) Top management leadership with organization wide participation and understanding.
 - 2) Focus on continuous improvement in both the product and process, as well as looking for the big jumps
 - 3) Design quality in versus inspect the quality in
 - 4) Develop feedback systems throughout the entire organization

all of these guidelines are pursued with the idea of creating zero defects, zero inventory, zero lead time, etc. Basically to advance down the learning curve, and to extract as much benefit from the curve as fast as possible. To design a TQM program one generally focuses on the following issues²⁴:

- 1) What are the goals, objectives, philosophies, and strategies involved?
- 2) What is the allocation of responsibility?
- 3) What are the decision tools which will be used?
- 4) What will the common language of the firm be?

²³ Bridge, David and Charles Fine "Managing Quality Improvement" Quest for Quality: Managing the Total System, Institute of Industrial Engineers, Industrial engineering and Management Press

²⁴ Fine, Charles; Course notes, MIT, Leaders for Manufacturing program.

- 5) What will be the measurement system?
- 6) How will the transition take place?

Total Quality Management for Massachusetts:

Looking at the ideas listed above, one sees that the philosophy of TQM can be applied to state government when one thinks of the bureaucracy which carries out government programs as the manufacturing arm of a firm. Hayes and Wheelwright's representation of how manufacturing can contribute to the competitive advantage of a firm can be used to analyze how a bureaucracy contributes to the competitiveness of the government. Remember that while the problems that Massachusetts has can be considered to be competitive in nature, they stem from a lack of communication between the customer (constituent) and the firm (government). One of TQM premises is that keeping track of what the customer wants and delivering it is the primary mission of any firm. The problems stated in the second chapter: communications, structure and evaluation, are all addressed through a TQM philosophy. Looking at how the bureaucracy can improve its performance as measured by how well it is responding to voter needs addresses both questions raised by Kanter at the beginning of this paper. Focusing on how to improve government performance not only expands on what the state government can do, but also directly influences what the state government should do.

Thus figure 4-1 could be restated for the state government. Looking at Massachusetts one can see that presently the bureaucracy (that part of the government which actually provides services) probably falls into either stage one or two.

Figure 4-6
Stages in a Government Bureaucracies Strategic Role²⁵

| Stage | Title | Description |
|--------------|---|---|
| Stage 1 | Minimize the Bureaucracy's negative potential: "Internally Neutral" | Outside experts are called in to make decisions about government efficiency (the GMTF reports). Internal, detailed management control systems are the primary means for monitoring performance. As shown in the PMIS and MMARS. The bureaucracy is reactive. |
| Stage 2 | Achieve parity with competitors: "Externally Neutral" | "Industry" practice is followed. The planning horizon for investment decisions is extended to incorporate a single business cycle (such ideas as the "rainy day fund" show state planning at this level) Capital investment or new program creation is the primary means for catching up with other states and achieving economic growth. |
| Stage 3 | Provide credible support to the business strategy: "Internally Supportive" | Public capital investments are screened for consistency with long term state growth strategies A strategy for improving bureaucratic performance is formulated and pursued and the bureaucracy becomes proactive. Long term economic, political and social development trends are addressed systematically |
| Stage 4 | Pursue a bureaucracy based competitive advantage: "Externally Supportive" | Efforts are made to anticipate the potential of new management practices and technologies on the bureaucracy and the delivering of public services. Bureaucrats are involved "Up front" in major policy decisions in an effort to answer the question what services should the state provide by telling what services the bureaucracy can provide. Long-range programs are pursued in order to acquire capabilities in advance of needs |

The 1990 GMTF report²⁶ also looks at the bureaucracy in a similar way and is shown through the organization of its report. The report, whether knowingly or not has followed a TQM philosophy. The first chapter deals specifically with the economic framework of the state which is in effect establishing a common language for all concerned. The second chapter

²⁵ "Competing through Manufacturing", p. 100, Exhibit 1

²⁶ The Governor's Management Task Force 1990, Massachusetts: Managing Our Future

deals with control issues, specifically those of management and the ground force employees which establishes the allocation of responsibility and the measurement system. The next two chapters talk about the health problems and the human resources of the state, which are the problems which have been left largely unresolved from past studies, but have become the primary focus of the report (i.e. the goals and objective of the program). The final chapters talk about long term investment both in the infrastructure, the people, and in the ways revenue is raised which is similar to suggesting that the bureaucracy move from its present stage one or two placement to stage four. The suggestions in the report are complex and dynamic in the sense that the authors do not expect them to be implemented overnight.

"The above-described program cannot be accomplished overnight. Time is needed to design and to implement change. Massachusetts has the financial strength and flexibility to undertake the effort required, and needs to use that strength to construct a financial "bridge" over the present slow-growth adjustment taking place in the state's economy."²⁷

Many of the specific suggestions revolve around issues of what the common language should be, how the decisions should be made and who will make them. These have been conglomerated into regeneration of cabinet positions and lines of communications, but like so many of the projects in the past, these proposals which attack more specifically that any past studies the source of Massachusetts present structural and financial problems, will fail to solve them unless they implement within the context of a TQM philosophy.

For Massachusetts, the philosophy of TQM (better communications with the customer) is the overriding need. Communications with the government have generally been through voting and have been at the policy level (which would be synonymous with an overall business plan when compared to industry). However there is another equally important line of communication which goes between those who supply the services and those who receive them, which should be utilized more extensively. Thus in designing a TQM backed implementation plan for the proposals made by the 1990 GMTF one must first ask what are the major objectives. There are at least three different sets which have different time scales which need to be balanced. First there is the structural financing problems as documented by the MTF which include health-care costs and debt which must be addressed immediately (and the 1990 GMTF does this to some extent). Secondly there must be an effort at improving the development and communication of long term policies. And finally there must be a concerned effort at developing a program improving the delivery of services. All of these fall

²⁷ GMTF 1990, p. 2

into the category of creating a better learning organization which takes advantage of the fact that better quality is cheaper.

The next question which is the allocation of responsibility has to be addressed after the specific programs are in place, but should be, to avoid the problems of past proposals, implemented at the lowest possible level. One of the main tenants of any TQM programs is that for proper execution it must be backed by the leaders, but everyone must understand the goals and the methods of achieving them. Otherwise total quality of the final product will suffer. In this system it only makes sense to decentralize responsibility. Defining a common language will be a hard task for the state government since the managers tend to talk in terms of dollars, the policy makers talk in terms of solving social and economic problems, and the bureaucracy deals in number of people helped. The best type of compromise is always to deal in operational terms (how many people served, percentage of money used in services versus administration), but to do so in a context of not what percentage of the problem is solved, but rather how well the operation has achieved its goals. Then at a higher level the language should be how well the goals of any program have met the needs of the community. Both the decision tools and the measurement system are intricately linked. Most often cost-benefit analyses have been used to decide between competing programs, but when dealing with the operational measures discussed above, cost-benefit may not be the most practical tool. Many other decision tools are available which should be used and evaluated. The measurement system is probably the most critical part of any TQM backed program, since it is this data which will suggest the decision tool, and will provide evidence for the success or failure of a program or department. It is critical that the measurement system be operational in base, and be accurate²⁸. Suggestions should be percentage of people helped versus those who qualify, amount of money spent on administration versus actual services, amount of time spent on administration versus services, etc.

By focusing on the four guidelines of any TQM backed program: top management leadership and full employee understanding- continuous improvement in the process- design quality in- and fully developed feedback systems; the Massachusetts state government should be able to implement the GMTF 1990 proposals (and others) aimed at resolving the problems facing it, in a manner which will both improve the overall quality of its services and reduce the cost.

²⁸ Examples of present problems in the data will be shown in the Appendix.

Chapter Five: Conclusions: The Role of TQM as a Response to Non-linear Problems

This chapter will provide the finishing component to the thesis argument by advancing the idea that the adoption of a TQM philosophy by the stage government is both critical and should be the primary concern of the new administration since that philosophy provides the framework both to solve our present problems and to create new opportunities for the state . But before that stance is taken it is important to point out what makes a TQM philosophy properly geared towards the solution of modern problems, both industrial and governmental; when the past philosophies of mass manufacturing, economies of scale, centralization of control seemed to have failed.

The Non-linear Nature of Many Present Day Problems:

Many problems which face both the manufacturing world and the policy world can be thought of as being non-linear in the sense that a solution to an overall problem can not be made by separating out smaller individual parts and combining their individual solutions. An example involving policy might be that one could consider the problem of high school drop-outs to be related to poverty, job issues, family life, etc. Solving all of these problems independently would not necessarily solve the drop-out problem because what is critical are the connections between poverty and education, home-life and education, which are lost when one attacks each of the smaller problems. This is equivalent to stating that many policy analysis techniques: cost-benefit, risk-benefit, etc., function quite well when the main objectives are defined. But in a situation where the connections between different sub-problems (such as poverty and family life as described above) become as important as the subproblems then defining objectives becomes almost impossible.

In manufacturing to gain economies of scale, different tasks were split up so that each independent group performed only one task, but did it well. As was shown by the early attempts to regain industrial competitiveness, American firms focused their attention on each of these groups but missed those improvements which could be made by examining not how each group functioned itself, but how the groups influenced each other. The TQM philosophy of keeping the customer happy is just a yardstick to measure the connections the groups have. It is not the only measure, but it is the most useful for most companies (and especially for government) because it is what business boils down to.

The tools of TQM (the constant feedback loops) are not unnatural to individuals, but can often seem unwieldy to large organizations. When an individual confronts a difficult problem, he often does not take a linear approach to it; progressing from point A to B and then to C. Rather he predicts where B should be does A and then see if he is close to B, if he is he

advances, if not he adjusts his plan (this is non-linear in nature and is iterative using feedback from previous steps). Large organizations have thought this type of iterative system to be inefficient. However when moving from group to group in a linear fashion with little feedback one runs the risk of engineering a product which can not be built or which performs poorly, but the original designers never find out. When an organization adopts a linear way of thinking it examines each individual group function in depth and can make each group more efficient. Sometimes their examination might include the groups immediately upstream and downstream but rarely the connections to other groups. The government is the same as a firm and the people who design the policies and programs are often far removed from those that have to administer them, and the only feedback they get from the customer is during elections.

It is not that the past systems of mass-manufacturing or centralization of control are failing, in fact they perform the task they were designed to do quite well. But there are problems and processes which must be confronted which exhibit this non-linear nature, both in government and industry, and they must be dealt with in a non-linear fashion¹. The key of course is figuring out which problems are non-linear. However one of the traits of a TQM is that it works well in both types of systems.

Conclusions:

TQM as a philosophy is not hard for any one person to adopt. Many senior executives have been dubious of its overall usefulness because the concepts seem so basic. However designing TQM programs, much less implementing them have proven to be difficult challenges for many organizations. Often from bureaucratic inertia or sometimes for political reasons, TQM programs get sidetracked and die a slow death due to inattention from senior management. The programs outlined by the 1990 GMF are doomed to failure unless the entire government is forced into thinking about quality. The guidelines for any TQM program address the heart of the problems facing Massachusetts, poor communications, non-linear social and structural problems, and evaluation problems. By analyzing existing industrial TQM systems, the state government has a vast reserve of knowledge available to it to aid in the implementation.

The adoption of an overall TQM program for the state government has to be at the forefront of any new administration. Only through the adoption of a TQM system will a state

¹ In fact many of the major social problems which remain largely unresolved (poverty, health, and education are examples) can be viewed as non-linear because the connections between them are so strong that it becomes almost impossible to analytically develop a solution. Rather, solutions have to be tried and improved on.

government really be able to coordinate the needs of its constituents and be able to use its natural advantages, whatever they might be, to truly influence the competitive position of its economy. Only through a TQM program will the bureaucracy be viewed as a competitive tool which provides a basis for getting programs implemented and providing appropriate feedback. Only a TQM program will provide the necessary common measurement tools and language which are needed for the state to progress out of its current crises.

Can a state improve its competitive position? The answer is undoubtedly yes, but it needs to know what its own advantages and disadvantages are. In Massachusetts as former Senator Tsongas has stated " The Massachusetts miracle is its university base. You take away MIT and there is no Massachusetts. Its the same for the rest of the country. Absent the intellectual thrust and were really going to be a second-rate power."² Massachusetts will never improve its economic position by wooing companies that use lots of energy and cheap labor, but it will by capitalizing on the large university base and by educating its citizens. A TQM program will force the state to focus its resources. As in industry, a states long term competitive position can not be improved by sacrificing the welfare of one group; whether its employees or students; industrialists or consumers for another. Especially in this state, many of the economic problems which are debated in the legislature need to be depoliticized and decided on their merits. All constituent groups must work together to improve all the linkages which make the economy and only a TQM philosophy will guide the government in doing this.

This has not attempted to be a "How to do" paper and provide all possible actions that the government should pursue to improve its competitive advantage; rather it has been a "How to think about the problem" paper. Past studies have been in the former category and have provided many improvements in specific programs. But as in industry, only a small percentage of improvement will come from these traditional efficiency improvement methods. The problem is competitive in nature since services are not being provided to the voters to their satisfaction. The parallel which exists between industry and government allows us to utilize past industrial experience which points to the fact that only by looking at the business in its entirety and examining how services are provided throughout the organization, are large improvements ever made.

² Werth, Barry "The Prophet of Lowell" in the New England Monthly, Sept 1990, p. 36

Appendix

TQM Program Implementation Problems in Massachusetts

As stated in the fourth chapter, deciding on which objectives a TQM program should focus on is a first step, but it is by no means the hardest. For any TQM program to be successful in Massachusetts it has to be designed to be implementable; and to work within the present politicized climate. This is not an easy task. Members of the government should take heart since many other companies, equally as large as the state government, have successfully implemented TQM programs. However they should be warned that other have failed in their efforts, despite top management leadership (or because of it), when they failed to examine the firm in its entirety.

Unfortunately, it is almost impossible for someone without a great deal of Massachusetts State government experience to outline where the pitfalls will be. For the plan to work it will have to be devised by the people who will implement it. One of the main tenants for any TQM program is that the entire organization has to be behind the effort. Given Massachusetts state politics, the best implementable plans will be the ones which allow the most autonomy for the operating groups, relieving them from most of the political interference which could occur.

However, there are some distinct problems which Massachusetts must overcome if it is to proceed with a TQM program. These revolve around the issues of accountability/responsibility as well as measurement tools. Simply put, the problems of figuring out who will perform what task, how they will be hired and evaluated, and their responsibilities to other organizations ; as well as how organizational and program performance will be measured will be the Achilles heel of this endeavor. Unfortunately these are the two areas which have been attempted to be rectified in the past the most times, with the least success. This section will not attempt to address all the problems that industry has found which could dampen the ability of the government to implement its plans; rather it will consolidate the observations into two major areas. The first dealing with measurement tools and the second with human resource management.

Measurement Tools:

Finding out what the facts are in any business can seem deceptively easy; but many companies have run on what are called "Gut fact" versus real fact. Gut facts are the ones which have been around for so long that everyone takes as a truth, but no one ever bothers to question. Some businesses have been astonished to find that instead of their largest customers making the most money for them, they actually cost the company money because they were

supplying a great deal of extra administration for the large accounts.¹ It is imperative that the government not be run on gut facts. Not so much because they are wrong, but rather poor information turns public policy debates into political fights and destroys the confidence of the voters. If any progress is ever to be made then the "facts" have to be well established and believed by all. For this reason the specific areas of performance measures for the economy and administration need to be examined.

In terms of economic measurements and the overall effect of government policy on the economy, the shift-share analysis put forward by Ferguson and Ladd offers great possibilities. Recalling from chapter four, the shift-share analysis is a way of separating out from Massachusetts national job growth trends. One of the benefits of the system is that one accounts for the fact that Massachusetts does not have the same industry mix as the rest of the nation. Specifically the representation of a shift-share analysis can be stated as:

The change in Jobs in Massachusetts from year 1 to 2 is equal to the national growth rate of jobs from year 1 to 2 multiplied by the total employment in Massachusetts in year 1 + the summation over all industrial sectors of the the Massachusetts employment in that sector in year 1 multiplied by the difference between the growth rate in that sector and the national average + the competitive shift which is due to Massachusetts policies.

Algebraically this can be written as:

$$\Delta \text{Mass}_1^2 = \Delta \text{Jobs (National)}_1^2 + \Delta \text{Industry}_1^2 + \Delta \text{Comp}_1^2$$

where

$$\Delta \text{Mass}_1^2 = \text{Change in Jobs in Massachusetts from year 1 to 2 ,}$$

$$\Delta \text{Industry}_1^2 = \text{Industrial mix effect} = \sum_{i=1}^n E_{i,j} (N_{g,i} - N_{g,j})$$

$E_{i,j}$ = Employment in Massachusetts in industrial sector i at base year j

$N_{g,i}$ = National growth rate of sector i from year 1 to 2

$N_{g,j}$ = National Average Growth rate from year 1 to 2

ΔComp_1^2 = Competitive Shift

$\Delta \text{Jobs (National)}_1^2$ = Growth in Jobs if at National Rate

This type of analysis has the extra benefit of being able to be performed on a regional basis as well. Throughout the late 1970's and early 1980's a debate has raged over the growth rate of different areas of the state. Nine separate areas have been identified as having their own economic problems, and this technique could be used to isolate the performance of policies aimed at specific sectors of the state. This is particularly useful because many of the programs

¹ Kaplan, Robert; from a lecture on the uses of Activity Based Accounting, Spring 1990, Sloan School, MIT

initiated by Gov. Dukakis and suggested by the 1990 candidates center around encouraging growth in depressed areas of the state.

While the description of the technique seems straight forward, there are some problems with the execution. For example the data used by Ferguson and Ladd could not be reproduced, and thus the results of this author, which exhibit similar trends, are not the same. This is most likely due to the fact that there are two different data sets available which contain employment data. The 202 data series contains complete employment data for all states and their SMDA's (Standard Metropolitan District Areas) down to at least the three digit SIC category². However this series is plagued by non-economic changes in its reporting system and the fact that large portions of the government work-force was not recorded until the mid-1970's. In an effort to achieve a more consistent data set, the 790 series which "fine tunes"³ the 202 series. Unfortunately, the 790 series is not available in as much detail as the 202 series. Most of Ferguson and Ladd's data matched up exactly with the 202 data, except in areas such as services and government employees. For the manufacturing sector, the 202 , the 790 series , and Ferguson and Ladd's data agree almost exactly, but the data for the other sectors do not. This could be because Ferguson and Ladd attempted to correct for the systematic inconsistencies of the 202 data. No matter what data series one uses, the level of aggregation makes a difference. Figure A-1 shows a comparison of many different estimations of the industrial mix effect and the competitive shift in the Massachusetts economy over the periods analyzed by Ferguson and Ladd.

² SIC numbers are the way the Dept. of Commerce categorizes different industries. Major rankings are items such as Manufacturing, Services, Government. The level of detail corresponds to the number of digits Primary metal's two digit number is 33. Everything which is considered a primary metal would have as its first 2 digits 33 although its last 2 digits could be anything. The total employment for a two digit code is the summation of all the three digits below it. For further clarification there are many manuals about the SIC system which should be referred to.

³ Although I have asked people both in the Boston office where the numbers are generated for Massachusetts and at the Federal level what exactly fine tuning means, and no one seems to know exactly.

Figure A-1⁴
**Comparison of Different Methods of Estimating the Competitive Shift of the
 Massachusetts Economy for Selected Periods, 1967 to 1983**

| | | Industry Mix + Growth at US rate | | | | Competitive Shift | | | |
|-------------------------------|----------------|----------------------------------|-----------|-----------|-----------|-------------------|-----------|-----------|-----------|
| | | Period | | | | | | | |
| | | 1967-1975 | 1975-1979 | 1979-1983 | 1975-1983 | 1967-1975 | 1975-1979 | 1979-1983 | 1975-1983 |
| 790 Series Major | | | | | | | | | |
| Mass | Δ Jobs (Tot) | 125.2 | 330.4 | 89 | 419.4 | | | | |
| | Δ Jobs (Prv.) | 57.2 | 278.8 | 134.3 | 413.1 | | | | |
| | Δ Jobs (Pub.) | 68 | 51.6 | 45.3 | 6.3 | | | | |
| | Private | 264.6 | 357.1 | 21.9 | 380.9 | -207.4 | -78.3 | 112.4 | 32.2 |
| | Public | 85.9 | 31.3 | -2 | 29.4 | -17.9 | 20.3 | 47.3 | -23.1 |
| | Total | 350.5 | 388.5 | 19.9 | 410.3 | -225.3 | -58.1 | 69.1 | 9.1 |
| | 2 digit | | | | | | | | |
| | Private | 268.2 | 363.1 | 31.5 | 397.2 | -211 | -84.3 | 102.8 | 15.9 |
| | Public | 85.9 | 31.3 | -2 | 29.4 | -17.9 | 20.3 | 47.3 | -23.1 |
| | Total | 310.1 | 394.4 | 29.5 | 426.6 | -184.9 | -64 | 59.5 | -7.2 |
| 202 Series Major | | | | | | | | | |
| Mass | Δ Jobs (Tot) | | 577.8 | 78.9 | 656.7 | | | | |
| | Δ Jobs (Prv.) | | 291.8 | 125.2 | 417 | | | | |
| | Δ Jobs (Pub.) | | | | | | | | |
| | Private | | 371.9 | 27.9 | 400.9 | | -80.1 | 97.3 | 16.1 |
| | Public | | | | | | | | |
| | Total | | | | | | | | |
| | 2 digit | | | | | | | | |
| | Private | | 389.5 | 38.6 | 428.9 | | -97.7 | 86.6 | -11.9 |
| | Public | | | | | | | | |
| | Total | | | | | | | | |
| F&L Major | | | | | | | | | |
| Mass | Δ Jobs (Tot) | 90 | 295 | 93 | 388 | | | | |
| | Δ Jobs (Prv.) | 41 | 274 | 117 | 392 | | | | |
| | Δ Jobs (Pub.) | 49 | 21 | -24 | -4 | | | | |
| | Private | 257 | 353 | 29 | 386 | -216 | -79 | 88 | 6 |
| | Public | 68 | 24 | 2 | 25 | -19 | -3 | -26 | -29 |
| | Total | 325 | 377 | 31 | 411 | -235 | -82 | 62 | -23 |
| Maximum difference (%) | | | | | | | | | |
| | Δ Jobs (Tot) | 39.1% | 95.9% | 17.9% | 69.3% | | | | |
| | Δ Jobs (Prv.) | 39.5% | 6.5% | 14.8% | 6.4% | | | | |
| | Δ Jobs (Pub.) | 38.8% | 145.7% | -288.8% | -257.5% | | | | |
| | Private | 4.4% | 10.3% | 76.3% | 12.6% | -4.0% | -19.9% | 29.8% | -370.6% |
| | Public | 26.3% | 30.4% | -200.0% | 17.6% | -5.8% | -776.7% | -281.9% | -20.3% |
| | Total | 13.0% | 4.6% | 55.8% | 4.0% | -21.3% | -29.1% | 16.1% | -139.6% |

⁴ Data for the 790 Series comes from Employment and Earnings and its supplement, Department of Labor, U.S. government, various years and are benchmarked to March 1988. The 202 data series comes from Employment and Wages Annual, Department of Labor, Bureau of Labor Statistics, various years

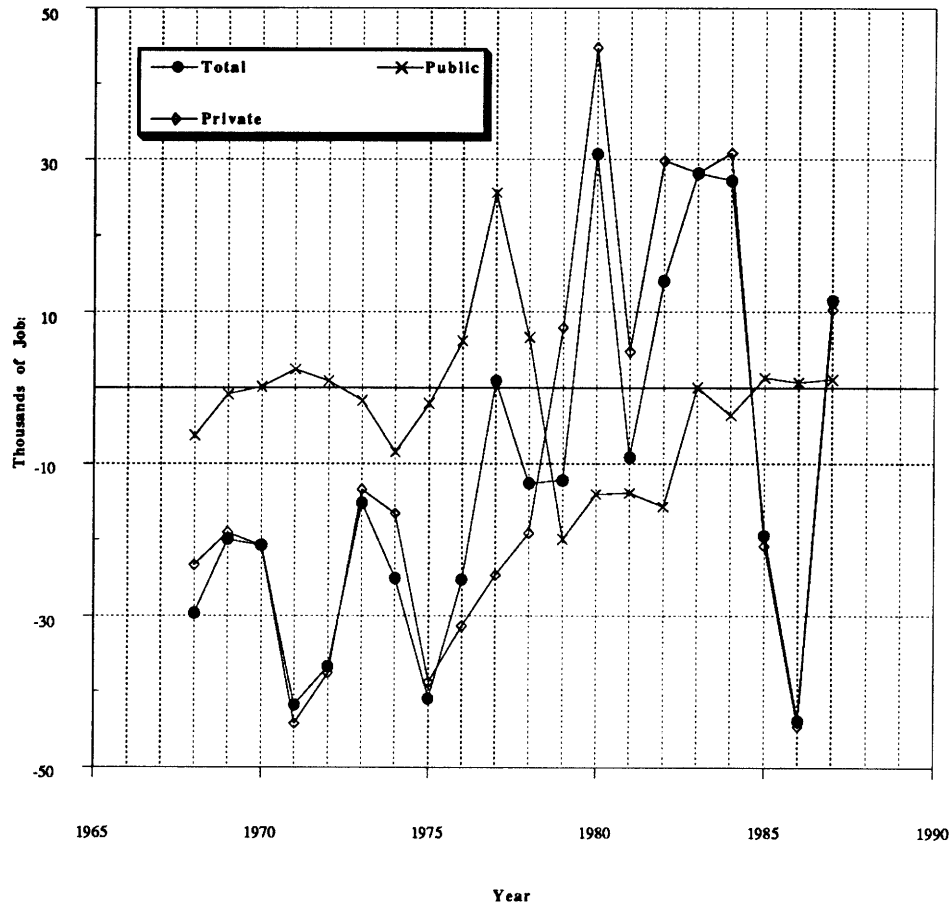
Listed are the change in Massachusetts jobs (ΔJobs) for the total economy (Tot), the private sector (Prv) and the public sector (Pub). In the second major column are the sum of the industry mix and national growth rate effects. The third major column represents the competitive shift which is the residual from subtracting out the national and industry mix effects from Massachusetts job growth. Five different calculation attempts were made for each of the time periods where data was available. The first uses the 790 data series in two ways. The competitive shift was calculated by estimating the industry mix effect based just on major SIC classifications. The second is based on 2 digit classifications. One can see that there is some difference between the two procedures which would be more acute if the 790 series had a complete 2 digit data set for Massachusetts. While it has one for the U.S. it does not have one for individual states, often leaving out huge portions of the service sector, the fastest growing sectors of the economy. An example can of the large gaps in data can be shown by looking at figure A-3 and A-4 (attached at the back of this section) which provide examples of employment data for the U.S. and Massachusetts for both data series.

Unfortunately, there is no breakdown of public employees in the 790 data series at the 2 digit level, thus only the data in the private sector changes. The 202 series was analyzed in a similar manner, showing differences both between the major sector, the 2 digit analysis, and the 790 data series. Because the 202 was known to have bad public employee records for part of the time series they were not calculated. The results of Ferguson and Ladd⁵ are shown as a comparison. At the bottom of the table is the maximum percentage difference which occurred in the measurements and calculations. As one can see, the trends and relative magnitudes are the same for all the calculations, but the relative error can be large.

It is clear that the data needs to be more complete before this tool can be fully used to its maximum potential. But shift-share analysis only will tell how well the economy is generating jobs, which is of course only one measure. The other problem is that often there is no apparent way of estimating what the time scale should be in any particular program, and thus the analysis could be susceptible to the time period selected. Figure A-2 shows a graph of the annual competitive shift in the Massachusetts economy, based on the major SIC categories of the 790 data series.

⁵ Ferguson, Ronald, and Helen Ladd "Economic Performance and Economic Development Policy in Massachusetts", State, Local, and Intergovernmental Center, J.F. Kennedy School of Government, Harvard University, Discussion paper D86-2, 1986, p. 27

Figure A-2
Total Competitive Shift in the Massachusetts Economy, Annual Calculations
Major SIC Categories of the 790 Data Series



As one can see the yearly shifts can be quite large. When analyzing public job growth, the idea situation would be to be improve services without expanding the public workforce, so a large positive benefit from the public sector would be undesirable.

There are other indicators of the economy which would be useful to know. What is the Gross State Product? How is multifactor productivity and labor productivity changing within the state? Unfortunately this data either does not exist or is extremely hard to get. The last issuance of the Gross State Product was done for the period 1969 to 1986 by the Federal

Reserve Bank of Boston⁶, and does not seem to be a regular publication. In addition there are many academics that believe the present measurement techniques are flawed and create a bias in the reporting system.⁷

Measuring the performance of the economy is only half the battle. One needs to be able to measure the performance of the administration as well as the performance of the individual programs if any real improvement is to be obtained. Often the best measurements should be operational ones. How many people are employed, how much of the money goes to overhead, how much to programs? And while this data is obtainable, often it is of dubious quality. For instance the data published by the MTF on the number of equivalent full -time employees of the state, is measured at different months for each year. And the MTF readily acknowledges that this arbitrariness in when the data is recorded bothers them, but since they receive their data from the government there is little they can do. In addition, the reporting rules change over the years so it can be quite hard to keep track of which money actually belongs in which type of subsidiary account. One good measure would be the percentage of time administrators devote to budgetary and other administrative activities. Another would be the percentage of the state budget which goes to personnel services (salaries in all categories), to health benefits, to state aid, etc. But these numbers are usually conglomerated at the state level and need to be refined to a program and department level to be helpful in evaluating performance.

There are many modern tools which could be used to help facilitate this process. One is to make the budget based specifically on programs and milestones. By creating a budgetary system (at least for new programs) which would have an automatic review system written into the legislation at specific milestones, the bureaucrats would be better able to manage their time and resources, and the measurement systems would be built into the program. There are many examples of the usefulness of both programmed budgets and milestone budgeting⁸. An incremental budgetary system is not a system set-up for learning, it is just set-up to keep track of what happened last year and makes no sense when compared to the excellent evaluation information provided by the other systems.

⁶Kinsella, Anne and Deanna Young Gross State Product: New England 1969-1986. ⁶Federal Reserve Bank of Boston, Sept 1988

⁷ Israilevich, Phillip and William Testa "Determining Manufacturing Output for States and Regions" Federal Reserve Bank of Chicago, Working paper, 1989-4, Feb. 1984, p 1-16

⁸ Babunakis, Michael Budget Reform for Government: A Comprehensive Allocation and Management System (CAMS), Quorum books, Westport, Conn., 1982 and Glass, G. Wayne "Assessing the Effectiveness of Milestone Budgeting" Government Doc # Y10:2:B 85/24 July 1987

Another tool which would be quite useful is activity based accounting. This method has been outlined by Robert Kaplan⁹ and consists of assigning overhead based on what is actually used by that activity, not labor hours or machine time or however else it might be done. While the effort can be complicated, Kaplan has achieved remarkable results. Presently much of the cost of any service or product is often contained in the overhead, and how that is divided up among different programs could be critical in determining the overall cost of the program. Many business have been amazed at how much of their overhead was being used by a few companies, and simple changes in administration procedures greatly decreased the costs of the products. This type of accounting system could be used to more accurately estimate which programs are using the most resources of the government.

These are just some of the tools which have been developed and could be used effectively to provide better information. But it is important that any information be timely in nature. It is critical to any TQM program that feedback loops be created which the appropriate time scale. In industry it makes little sense to tell the machine operator at the end of the day that his machine is not adjusted properly after he has made 1000 parts; the same is true in government. Timely feedback is the key to solving non-linear problems using TQM philosophy, but to do that one has to rely either on the appropriate communication technology, or more often in a service environment, the personal.

Human Resource Management:

Currently there is probably no other greater hope for success (or obstacle to success) for the TQM program than the employees of the state. They will be the people who pull the program through the binds that will occur, or they will sink it. Judging from what the MTF had to say about the program managers in their efficiency study, one would think that the possibility for success would be high; but the civil service system has slowed them down and has been the major stumbling block reported by all the efficiency reports to date. Even the 1990 GMTF has stated that the resolution of the personnel problem has to be high on the priority list. But the problem is complicated by the fact that many different types of people are employed by the state; some are political appointees, some are career and some are part of the patronage system. There is the extra problem that if the state becomes rapidly more efficient, the possibility exists that some of the support staff and administrators would not be needed at their present jobs. This creates a conflict of interest for people because it could be their own jobs they are working to eliminate.

⁹ Kaplan, Robert "New Approaches to Measurement and Control", December 1989, Chapter 5 for Bower (Ed) Battling Back and an expanded version of the paper "Management Accounting for Advanced Technological Environments", Science 25 August 1989, p. 819-823

The program could easily get sidetracked through three major avenues. The first could be through misinformation to the people who are designing the program. Especially if the impression they give is that they are looking for inefficiencies and poor workers. Then the chance of getting useful information is low, since no one would want to say that their job is useless. Secondly the project could get derailed through inaction, and thus there has to be a way to insure proper and timely compliance. Thirdly the project could be lost do to lack of guidance from the top. This is an especially relevant risk since there are many theoretical and academic problems associated with the measurements need for evaluation. If upper level management allows itself to be sidetracked for long periods of time, the project will fail due to lack of momentum. If however they do not solve problems correctly, the project could fail due to technical errors.

There are three solutions which could help alleviate these problems. The first would be to guarantee jobs for displaced administrators and clerks as front-line service providers (such as social workers). The MTF has pointed out that no new case-workers are being trained (see chapter 1) and that the ratio of cases to case-worker is rising past the legal limit. The state could pay for their tuition at the state university and these people would then have a stake in making the system work better since they will be at the front-lines actually providing the services. This process has the basic effect of transforming support staff into what would be considered line personal in industry. And even if every clerk took the opportunity, the overall costs might not change, but service would get better.

The second would be to create a group of senior staff whose job is not tied to any one project, but rather float between projects. Thus if one program does not turn out well, these people would be guaranteed employment for some length of time (maybe a year) in which they could be utilized on a new project. This way the bureaucracy gets built up around experience and skills and not specific programs, which creates vested interests when the program is evaluated.

The third way of managing the problems listed above would be to create a joint academic-state government program to research and study TQM related issues. The people in the state government could be responsible for implementing new measurement techniques, better computer communications, and resolving implementation problems as they occur. Academia would be involved in doing fundamental, long-term research. This allows the state government to stay abreast of the leading edge of any new technology or management technique which could be useful, without delegating a lot of internal effort to the process. It also creates the ability to coordinate a great deal of the smaller programs which are presently located around the state and region and to provide a higher profile for these problems and attract new students.

The Transition:

Each of these proposals have the ability to attract lots of attention to new government initiatives; which could be a mixed blessing. The transition from the present system to a fully TQM run government could take a long time, and there is little need for the government to try to implement rapid changes overnight. Perhaps the most important lesson from firms which have implemented large programs is that nothing breeds enthusiasm more than a successful example. Thus, in designing the first program or department which will run on a TQM basis it is critical that it be designed for success. Whether that means importing people from other departments who are already enthralled with the program and are guaranteed to do a good job, or starting with a small department; the first program must succeed. And since the crises which plagues the state is the lack of intelligent communication between the voters and the government it is important to use this as an example that the state is doing something, but not to build up expectations to the point where only a miracle would satisfy the public

The government will walk a fine line in the next few years. Any faith that is generated by public announcements that the state is revamping the way it does business will be lost if the programs fail. The government should takes its time, create an implementation team which has bureaucrats, academics, and industrialists (hopefully all participants will have some experience in all three areas) to oversee the design and implementation of the TQM programs. They should make great use of the natural educational resources of the state to familiarize themselves with past TQM experiences, as well as those of the federal government. They can be comforted by the fact that if they take the time to think the programs through, the final product will almost definitely be an improvement over what presently exists.

Figure A-3
U.S. and Massachusetts 790 Series Employment Levels Based on Two-Digit
SIC Numbers, Selected Years

| Title: U.S. 790 series data 3 - 88 benchmark | | U.S | | | | | Mass | | | |
|---|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 1967 | 1975 | 1979 | 1983 | 1988 | 1967 | 1975 | 1979 | 1983 |
| Category | SIC # | | | | | | | | | |
| Major Sources | | | | | | | | | | |
| Total Non-Farm (Empty) Covered by Unemployment Law) | | 65803 | 76945 | 89823 | 90200 | 105584 | 2147.9 | 2273.1 | 2603.5 | 2692.5 |
| Private Sector | | 54413 | 62259 | 73876 | 74330 | 88212 | 1850.8 | 1908 | 2186.8 | 2321.1 |
| Goods Producing | | 23308 | 22600 | 26461 | 23334 | 25249 | 788.2 | 652 | 748.4 | 712.6 |
| Service Producing | | 42495 | 54345 | 63363 | 66866 | 80335 | 1359.7 | 1621.1 | 1855.8 | 1979.9 |
| Total Agriculture | | | | | | | | | | |
| Agriculture, Forestry and Fish | 1 - 9 | | | | | | | | | |
| Ag. services | 7 | | | | | | | | | |
| Mining | 10 - 14 | 613 | 752 | 958 | 952 | 721 | | | | 1 |
| Construction | 15- 17 | 3248 | 3525 | 4463 | 3948 | 5125 | 87.4 | 74.2 | 75.6 | 82.6 |
| Manufacturing | | 19447 | 18323 | 21040 | 18434 | 19403 | 700.8 | 577.8 | 672.8 | 629 |
| Non-durables | 20-23,26-31 | 8007 | 7635 | 8280 | 7702 | 7967 | | 258.9 | 271 | 219.7 |
| Food | 20 | 1786.3 | 1657.5 | 1732.5 | 1614.8 | 1635.8 | 38.7 | 28.6 | 28.2 | 24.1 |
| Tobacco | 21 | 86.5 | 75.5 | 70 | 67.9 | 55.8 | | | | |
| Textile | 22 | 958.5 | 867.9 | 885.1 | 741.3 | 729.1 | 37.5 | 25.2 | 27.1 | 20.2 |
| Apparel | 23 | 1397.5 | 1243.3 | 1304.3 | 1163.4 | 1092.3 | 54.3 | 41.1 | 40.7 | 35.9 |
| Paper | 26 | 679.1 | 642 | 706.8 | 661.2 | 692.6 | 36.9 | 27.9 | 29.8 | 26 |
| Printing and Publishing | 27 | 1047.8 | 1083.4 | 1235.1 | 1298.8 | 1561.3 | 44.8 | 40.3 | 44 | 48.1 |
| Chemicals | 28 | 1001.4 | 1014.7 | 1109.3 | 1042.8 | 1064.5 | 19.9 | 19.8 | 18.2 | 16.8 |
| Petroleum and Coal | 29 | 183.2 | 194.4 | 209.8 | 195.6 | 161.8 | | | | |
| Rubber and plastics | 30 | 516.4 | 608.1 | 781.6 | 711.1 | 829.4 | 37.5 | 27.8 | 32.5 | 30.5 |
| Leather | 31 | 350.9 | 248.2 | 245.7 | 204.9 | 144.3 | 44.3 | 23 | 22.2 | 16.7 |
| Other (non-durables) | | -0.6 | 0 | -0.2 | 0.2 | 0.1 | | 1.5 | 1.5 | 1.4 |
| Durables | 24,25,32-39 | 11439 | 10688 | 12760 | 10732 | 11437 | | 318.9 | 401.1 | 409.2 |
| Lumber, Wood, | 24 | 649.1 | 614.7 | 766.9 | 656.5 | 764.8 | | 4.4 | 13.9 | 11.9 |
| Furniture | 25 | 434.1 | 416.9 | 497.8 | 448 | 529.7 | | 8.4 | | |
| Stone,Clay, and Glass | 32 | 628.3 | 629 | 708.7 | 570 | 599.9 | 12.6 | 10.9 | 13.7 | 11.3 |
| Primary Metal | 33 | 1267 | 1139 | 1253.9 | 831.8 | 773.7 | 20.9 | 15.5 | 17.6 | 15 |
| Fab. Metal | 34 | 1556.6 | 1458.3 | 1717.7 | 1370.1 | 1431.1 | 51.6 | 49.2 | 55.1 | 46.1 |
| Machinery | 35 | 1969.6 | 2056.8 | 2484.8 | 2033 | 2081.8 | 75.9 | 74 | 101.6 | 111.9 |
| Elect. and Electronics | 36 | 1907.2 | 1701.6 | 2116.9 | 2012.9 | 2070.2 | 102.3 | 82.8 | 104.6 | 97.9 |
| Transport Equip. | 37 | 2080 | 1715 | 2077.2 | 1747.2 | 2051.3 | 41.4 | 30 | 37.1 | 35 |
| Instruments | 38 | 518.8 | 550.1 | 691.2 | 692 | 748.5 | 38.1 | 43.7 | 57.5 | 57.7 |
| Misc. Mfg | 39 | 428.4 | 406.8 | 444.8 | 370.5 | 385.7 | | 23.7 | 26.8 | 22.4 |
| Other (Durables) | | -0.1 | -0.2 | 0.1 | 0 | 0.3 | | 0 | 0 | 0 |
| Other Manufacturing | | 1 | 0 | 0 | 0 | -1 | 44.1 | 0 | 0.7 | 0.1 |
| Trans, Comm., Pub. Util | 40-42,44-49 | 4268 | 4542 | 5136 | 4954.3 | 5548 | | | | |
| Transportation | 40-42,44-47 | 2656 | 2635 | 3021 | 2744.9 | 4266.8 | 109.9 | 113.7 | 120.5 | 118.2 |
| Total Trade | | 13606 | 17060 | 20193 | 20881 | 25139 | 448 | 511.8 | 566.3 | 612.7 |
| Wholesale Trade | 50-51 | 3689 | 4415 | 5204 | 5268 | 6029 | | | | 140.8 |
| Retail Trade | 52-59 | 9917 | 12645 | 14989 | 15613 | 19110 | | | | 471.9 |
| F.I.R.E. (Total) | 60-67 | 3185 | 4165 | 4975 | 5468 | 6676 | 113.4 | 135.8 | 150.4 | 171.8 |
| Finance | 60-62,67 | | 1962 | 2368 | 2741.2 | 3290.3 | | | | |
| Banking | 60 | 869.5 | 1273.9 | 1498.5 | 1660.8 | 1737.6 | | | | 53.1 |
| Insurance | 63-64 | 1211 | 1425 | 1630 | 1719.6 | 2081.6 | | | | |
| Real Estate | 65-66 | | 779 | 977 | 1007.1 | 1304.2 | | | | |
| Services | 70-89 | 10045 | 13892 | 17112 | 19694 | 25600 | 391.3 | 494.7 | 601.9 | 705.8 |
| Health | 80 | 2434.3 | 4133.8 | 4992.8 | 5988.2 | 7144.2 | | | | 226.2 |
| Legal | 81 | 198 | 340.3 | 459.9 | 602.1 | 851.9 | | | | |
| Educational | 82 | 842.1 | 1000.9 | 1089.7 | 1226.2 | 1557 | | | | 110.6 |
| Other(Services) | | 6570.6 | 8417 | 10570 | 11878 | 16047 | | | | |

| Title: U.S. 790 series data 3 - 88 benchmark | | U.S | | | | | Mass | | | |
|---|----|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|
| | | 1967 | 1975 | 1979 | 1983 | 1988 | 1967 | 1975 | 1979 | 1983 |
| Non-Classifiable | 99 | 11391 | 14686 | 15947 | 15869 | 17372 | 297.1 | 365.1 | 416.7 | 371.4 |
| Government | | 2719 | 2748 | 2773 | 2774 | 2971 | 68.2 | 58 | 58 | 55.7 |
| Federal | | 2302 | 3179 | 3541 | 3662 | 4063 | | 307.1 | | 95.8 |
| State | | 6371 | 8758 | 9633 | 9434 | 10339 | | | | 219.9 |
| Local | | | | | | | | | | |
| Residual | | -1 | 0 | 0 | 1 | 0 | 0.0 | 0.0 | -0.7 | 1.0 |
| | | | | | | | | | | Summations |
| | | | | | | | | | | By Majc Private |
| | | | | | | | | | | Public |
| | | | | | | | | | | Total |
| | | | | | | | | | | By SIC Private |
| | | | | | | | | | | Public |
| | | | | | | | | | | Total |
| Sources: | | | | | | | | | | |
| Major aggregates, 2 digit Mfg. SIC, and Govt data from Handbook of labor Statistics, Bull. 2340, August 1989, tables 68-71, p. 290. | | | | | | | | | | |
| Detailed Service 2 digit SIC from Supplement to Employment and Earnings, 1909-1984; august 1989 | | | | | | | | | | |
| Cols 1,2,3 from Employment,Hours, and Earnings, United States, 1909-84, Vol II. March 1985, Bull 1312-12 | | | | | | | | | | |
| cols 1,2,3 are for 3-83 benchmark, but data before 1983 are consistent with the 3-88 benchmark | | | | | | | | | | |

Figure A-4
U.S. and Massachusetts 202 Series Employment Levels Based on Two-Digit
SIC Numbers, 1975

| Composition of Massachusetts and US Employment | | Mass | US |
|--|---------------|-------------|----------------|
| 1975 202 Series Data (1000's) | | | |
| Category | Col # | SIC # | |
| | Major Sources | | |
| | | | 1 2 |
| Total Non-Farm (Empl) | | | 76984 |
| (Covered by Law) | | | 1975 68271.3 |
| Private Sector | | | 1874.7 60972.4 |
| Goods Producing | | | 666.8 23135.8 |
| Agriculture, Forestry and Fishing | | 1 - 9 | 9 318.2 |
| Mining | | 10 - 14 | 0.9 756.9 |
| Construction | | 15- 17 | 79.9 3622.2 |
| Manufacturing | | | 577 18438.5 |
| Non-durables | | 20-23,26-31 | 7708.8 |
| Food | | 20 | 28.4 1678.1 |
| Tobacco | | 21 | 0.08 78.5 |
| Textile | | 22 | 25.6 862 |
| Apparel | | 23 | 41.4 1277.2 |
| Paper | | 26 | 28.1 644.6 |
| Printing and Publishing | | 27 | 40.7 1080.8 |
| Chemicals | | 28 | 19.5 1033.7 |
| Petroleum and Coal | | 29 | 1.1 197.9 |
| Rubber and plastics | | 30 | 26.9 605.1 |
| Leather | | 31 | 22.5 251.1 |
| Other (non-durables) | | | |
| Durables | | 24,25,32-39 | 10729.6 |
| Lumber, Wood, | | 24 | 4.2 622.3 |
| Furniture | | 25 | 8.4 418.3 |
| Stone,Clay, and Glass | | 32 | 10.9 637 |
| Primary Metal | | 33 | 13.3 1143 |
| Fab. Metal | | 34 | 48.9 1462.8 |
| Machinery | | 35 | 74.3 2062 |
| Elect. and Electronics | | 36 | 85.7 1709.4 |
| Transport Equip. | | 37 | 29.3 1701.5 |
| Instruments | | 38 | 44 558.9 |
| Misc. Mfg | | 39 | 24 414.4 |
| Other (Durables) | | | |
| Other Manufacturing | | | |
| Trans, Comm., Pub. Util | | 40-42,44-49 | 108.6 4017.7 |
| Transportation | | 40-42,44-47 | 2103.5 |
| Railroad | | 40 - | 0.15 |
| Local and Interurban Transp | | 41 | 14.3 271.1 |
| Trucking and Warehouse | | 42 | 25.6 1113.7 |
| Water Transp. | | 44 nd | 197.9 |
| Air Transp. | | 45 | 7.6 369.4 |
| Pipelines (Exc. Natural Gas) | | 46 nd | 17.5 |
| Transportation Services | | 47 | 3.8 133.8 |
| Communications | | 48 | 37.4 1182.6 |
| Electric, gas, and sanitation | | 49 | 17.8 731.6 |
| Total Trade | | | 17218.8 |
| Wholesale Trade | | 50-51 | 117 4458.6 |
| Wholesale (Durable) | | 50 | 62.1 2549.9 |
| Wholesale(Non-Durable) | | 51 | 54.9 1908.8 |

| Composition of Massachusetts and US Employment | | Mass | US |
|--|-------|-----------------|-------------------------|
| 1975 202 Series Data (1000's) | | | |
| Category | Col # | SIC # | |
| | | | 1 2 |
| Retail Trade | | 52-59 | 395.9 12760.2 |
| Building Materials | | 52 | 12.7 527.6 |
| General Merchandise | | 53 | 58.8 2140.2 |
| Food stores | | 54 | 73.6 2025.7 |
| Auto Dealers and Service | | 55 | 40.1 1702.9 |
| Appareal stores | | 56 | 28.2 814.1 |
| Furniture stores | | 57 | 14.3 522.6 |
| Restaraunts and lounges | | 58 | 109.8 3392.6 |
| Misc. (Retail) | | 59 | 58.4 1634.4 |
| F.I.R.E. (Total) | | 60-67 | 131.6 4113.2 |
| Finance | | 60-62,67 | |
| Banking | | 60 | 44.3 1286.7 |
| Credit Agencies other than banks | | 61 | 5.1 438.8 |
| Security and commodity brokers | | 62 | 6.8 169.1 |
| Holdings and other Investment Serv. | | 67 | 2.1 38.3 |
| Insurance | | 63-64 | |
| Insurance carriers | | 63 | 44 101.4 |
| Insurance agents, brokers,service | | 64 | 12.1 345.3 |
| Real Estate | | 65-66 | |
| Real estate | | 65 | 15.95 759.8 |
| Combined realestate, insurance, etc. | | 66 | 1.3 30.4 |
| Other(FIRE) | | | |
| Services | | 70-89 | 455 12391.9 |
| Hotels and lodging | | 70 | 18.8 907.9 |
| Personal Serv. | | 72 | 23.6 849.1 |
| Business Serv. | | 73 | 66.14 2063.8 |
| Auto Repair and Serv. | | 75 | 13.2 441.8 |
| Misc. Repair Serv. | | 76 | 6.7 222 |
| Motion Pict. | | 78 | 4.4 205.4 |
| Amusement and Rec. Serv. | | 79 | 14 605.3 |
| Health | | 80 | 170 4063.2 |
| Legal | | 81 | 10.5 344.2 |
| Educational | | 82 | 59 711.3 |
| Social Serv. | | 83 | 17.3 568.9 |
| Museums | | 84 | 2 25.2 |
| Membership Organizations | | 86 | 18.7 639.6 |
| Private Households | | 88 | 0.04 24.2 |
| Misc. Serv. | | 89 | 30.6 719.9 |
| Other(Services) | | | |
| Non-Classifiable | | | 95 |
| Government | | | 7298.9 |
| Federal | | | 57.8 2894.1 |
| Postal | | 43 | |
| State | | | 42.4 2609 |
| State Education | | 82941 | |
| Local | | | 1795.9 |
| Local Education | | 82941 | |

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