Performance Indicators to Evaluate the Effectiveness of Structural Reform of the Chicago Public Transportation System

by

Anneloes Hesen

Master of Science in Science and Policy
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Submitted to the Engineering Systems Division
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Abstract

This thesis anticipates the need for structural change within public transportation systems and the need for clear goals and indicators relating to structural reform to provide real time course correction and periodic evaluation of goal achievement. The research is applied to the Chicago public transportation system because this system is currently experiencing problems and structural reform may be considered in the (near) future. Also, because structural change should deal with problems experienced in a particular system, performance should be evaluated primarily within that system over time and, physical and socio-economic differences among regions make it difficult to compare systems across metropolitan areas.

Literature review indicates that the focus of transit agencies is shifting from design standards to indicators that include a customer perspective. Main stakeholders to be represented in the performance indicators are discussed and the concept of triple sustainability is introduced in the need for indicators that reflect long-term changes in system usage or condition. Also, issues are listed that should be considered when narrowing down and refining potential indicators into a reasonable number of readily measured indicators. The electric utility sector is introduced to find potential lessons of what has worked, and what has failed, that may assist public transportation institutional structure reform. Data sources, both national and international, are studied and the advantages and disadvantages of each are discussed.

The history of the Chicago public transportation system demonstrates that tension has always existed between the city and the suburbs and illustrates the importance of political power, governance, and financing. The current system and its problems are described after which three solutions for structural reform are suggested, ranging from the current structure to major reform. A framework with triple sustainability, governance and finance is identified, which leads to identification of performance indicators to evaluate the effectiveness of structural reform of the Chicago public transportation system. These indicators are tested against the changes that occurred over the 25 past years as well as the possible problems anticipated over the next 10 years, to “proof” their usefulness.

Thesis Supervisor: Frederick P. Salvucci
Senior Lecturer of Civil and Environmental Engineering
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Personally, I would like to thank my family and friends. The phone calls, emails and visits from the Netherlands were very welcome. In addition, they have made me realize even better, the great opportunity it has been to study here. Of course, I could not have done this without my friends and fellow students from TPP and my research; Swati, Isabel, Zulina, Bassel, Jeff, Julie, Demian, and more; many thanks to all of you. Last but not least, I would like to thank Denis for his special friendship; and being there for me in the fun and tougher moments.
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<th>Description</th>
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<tbody>
<tr>
<td>ATI</td>
<td>Alternativa de Transporte Integrado</td>
</tr>
<tr>
<td>BPR</td>
<td>Bureau of Public Roads</td>
</tr>
<tr>
<td>CATS</td>
<td>Chicago Area Transportation Study</td>
</tr>
<tr>
<td>CDOT</td>
<td>Chicago Department of Transportation</td>
</tr>
<tr>
<td>CTA</td>
<td>Chicago Transit Authority</td>
</tr>
<tr>
<td>FTA</td>
<td>Federal Transit Administration</td>
</tr>
<tr>
<td>FWHA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>IDOT</td>
<td>Illinois Department of Transportation</td>
</tr>
<tr>
<td>ISTEAL</td>
<td>Intermodal Surface Transportation Efficiency Act of 1991</td>
</tr>
<tr>
<td>ISTHA</td>
<td>Illinois Toll Highway Authority</td>
</tr>
<tr>
<td>METRA</td>
<td>METRA Commuter Rail Division</td>
</tr>
<tr>
<td>MPO</td>
<td>Metropolitan Planning Organization</td>
</tr>
<tr>
<td>NIPC</td>
<td>Northeastern Illinois Planning Commission</td>
</tr>
<tr>
<td>NTD</td>
<td>National Transit Database</td>
</tr>
<tr>
<td>PACE</td>
<td>PACE Suburban Bus Division</td>
</tr>
<tr>
<td>PRHTA</td>
<td>Puerto Rico Highway Transportation Authority</td>
</tr>
<tr>
<td>RTA</td>
<td>Regional Transportation Authority</td>
</tr>
<tr>
<td>TEA-21</td>
<td>Transportation Equity Act for the 21st Century</td>
</tr>
<tr>
<td>UITP</td>
<td>International Association of Public Transportation</td>
</tr>
<tr>
<td>WCED</td>
<td>World Commission on Environment and Development</td>
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1 Introduction

In this chapter the topic of the thesis, "Performance Indicators to Evaluate the Effectiveness of Structural Reform of the Chicago Public Transportation System", is further defined and explained. This includes a description of the purpose and relevance of the research, reasons why the research is applied to the Chicago public transportation system, an overview of the history of public transportation in the United States, and a discussion of some basic terms and concepts that are used throughout this thesis. Also, the layout of the remaining chapters and the logic behind their sequence is provided.

1.1 Purpose and relevance of thesis

The purpose and relevance of this thesis originates from three main points, these are:

- Need for structural change within public transportation systems
- Need for clear goals and indicators relating to structural reform
- Need for performance indicators that focus on the 'system and beyond'

Need for structural change within public transportation systems

To be effective, services must please existing customers, improve quality over time to retain and expand the customer base, influence development patterns to permit expansion of the proportions of the metropolitan area accessible by public transportation, and expand the capacity and quality of service to reinforce this change. So metropolitan political/institutional structure for the provision of public transportation need to provide enough stability and reliability and growth in financial support, to be effective, and need to maintain and build political support for subsidies which will grow over time¹. But transit systems currently provide service for a minority of people and trips in the region, and rely on subsidy provided by the entire region to support existing service, and its expansion and “public attitudes, priorities and expectations are far from fixed, and the precise bounds of political feasibility are ever uncertain” (Altshuler).

Need for clear goals and indicators relating to structural reform

Within public transportation systems, a wide variety of metropolitan transportation oversight institutions exist. However, these structures generally lack adequate visibility to achieve independent political legitimacy, usually have weak powers, usually have goals that outstrip their capacity, and lack clear criteria and databases for evaluation of success and guidance of decision making. During fiscal or other crises (environmental, economic, etc.) these structures often become discredited, leading to pressure to restructure, but without clear goals and measures of effectiveness, crisis recurs (Salvucci, 2003b).

With clear goals and measures of evaluation related to restructuring, bureaucracy and political interest will know the basis of evaluation and be reminded of the policy intent of restructuring. This way there is a higher probability that the new structure will function towards the policy goals. Also, if the evaluation indices indicate failure to achieve the goals, there is time for course correction before a crisis (Salvucci, 2003b). This research proposes a methodology to restructure with clearer goals and measures of effectiveness to allow for improved implementation.

Need for performance indicators that focus on the ‘system and beyond’

Historically, performance indicators have been set up from an agency perspective and mainly included indicators related to the effectiveness and efficiency of an agency. This is illustrated by a TRB (2003) report which mentions that “Traditional service efficiency indicators and cost-effectiveness indicators are sometimes not linked to customer-oriented and community issues” and Tomazinis (1975) who states that “Efficiency analysis from the point of view of the operator, which is focused strictly on performance criteria and traffic load measurements, is clearly not considered enough for a meaningful assessment of the modern urban transportation system”.

Recently, there has been a shift of strategic focus from that of an individual company to a focus on the customers experience and the quality of service to the customer. In the past years, indices have been developed that not only measure and evaluate system performance from an agency perspective but also try to capture the customer’s viewpoint. However, besides considering the customer it is important to realize that a public transportation system is linked to more; in particular, traffic congestion (which adversely affects the entire economy) and air
pollution (which adversely affects public health). Reducing growing traffic congestion and air pollution will provide benefits to society beyond the direct customers of the service. This is part of the justification of public subsidy of transit and therefore these goals need to be explicitly included in any effort to measure performance.

The objective of structural change should be to improve that of the system as a whole. The perspective that “every system is part of another system” (Meyer and Miller, 2001) leads to the realization that linkages and relationships among systems are important. For example, when developing performance indicators, issues such as air quality, sprawl, automobile dependency, and land-use that are, indirectly or directly related to a public transportation system, cannot be ignored. Other examples of transportation system impacts are shown in table 1.

<table>
<thead>
<tr>
<th>Natural System Impacts</th>
<th>Physical Impacts</th>
<th>Social and Cultural Impacts</th>
</tr>
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<tbody>
<tr>
<td>Terrestrial ecology - habitats</td>
<td>Air quality</td>
<td>Displacement of people</td>
</tr>
<tr>
<td>Terrestrial ecology – animals</td>
<td>Noise</td>
<td>Land use</td>
</tr>
<tr>
<td>Aquatic ecology – habitats</td>
<td>Energy consumption</td>
<td>Employment &amp; business activity</td>
</tr>
<tr>
<td>Aquatic ecology – animals</td>
<td>Vibration</td>
<td>Infrastructure effects</td>
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The goal of this research is to consider the interactions of a public transportation system not only with itself but with other systems as well. This is necessary if you have both a short- and long-term perspective in mind and are looking for performance indicators that tie to concepts of sustainability.

1.2 Application of the research to the Chicago public transportation system

An important question is whether to develop performance indicators that can be applied to any public transportation system or whether to develop and apply them to a specific case. Discussions within the MIT research group and an internship at the Chicago Transit Authority (CTA) in Chicago lead to the thought that it would be more useful to apply the research to a specific case. The two main reasons for this are that to develop performance indicators it is necessary to know the objectives of structural reform. These may be different for each system. The second is that an internship at the CTA provided in-depth knowledge on a case that has the characteristics needed for this research.
Interviews held in Chicago during the summer of 2003 and a discussion with John Attanucci made clear that structural change is usually in response to a crisis. Resolving the crisis requires some alteration in organizational structure, but the structure itself is often not the entire reason for the crisis. To be effective, the structural change should deal with problems experienced in the old structure. Since every public transportation system is unique and has its own problems, it is best to target a real system experience and crisis which is perceived as rooted in the structure. Thus, it would be useful to develop indices or a method that can be used to measure the effectiveness of structural reform of a specific case, since this allows one to focus on the specific problems or structure that cause a crisis. At a later point, one can look back at the lessons learnt from the specific case and find those that can be extracted and applied to other systems as well.

Developing performance indicators for a specific public transportation system will make it possible to evaluate the performance of the system itself over time and allow one to determine whether structural change is being effective or not. Physical and socio-economic differences among regions often make it difficult to compare systems from different metropolitan areas. However, this does not imply that it would not be useful to look at and study public transportation systems and performance indicators in general, before focusing on and applying this to a specific case. This way it is possible to first distinguish indicators that are common to the industry before considering and selecting those that relate best to the specific case.

Finally, work that MIT (Center for Transportation Studies) has been doing with the Chicago Transit Authority over the past few years and the opportunity to experience the CTA from the inside during an internship in the summer of 2003, have shown that the public transportation system in Chicago is currently experiencing problems and structural reform may be considered in the (near) future. Some newspaper headings supporting this are “Mass transit headed for big trouble; CTA rides about to get bumpier” (Chicago Tribune, 2003), and “Put the CTA out of its misery” (Chicago Tribune, 2001). Also, in August 2003, a Regional Transportation Taskforce was installed by the Governor to gather information and make recommendations to the Governor and the General Assembly regarding transportation programs in Northeastern Illinois.

The main problem is that ridership within the RTA jurisdiction has declined by 30% in the last 25 years, while transit ridership has been growing in the rest of the United States (CTA, 2004b). Simultaneously, traffic congestion is growing. The main problems appear to be the lack of
adequate funding, financial and political/organizational structure, specifically the fund distribution of the Regional Transportation Authority (RTA) and inequity in representation. More background information on the Chicago public transportation system and its problems will be discussed in a later chapter. Please note that while the case studied will be the Chicago public transportation system because it fits well with the requirements for this research, the basic thoughts and frameworks can be applied to other transportation systems as well.

1.3 Definition of a public transportation system

Before continuing, it would be useful to define ‘public transportation system’. Especially for those not familiar with the term and also because literature review has shown that, depending on the context, this term can have different meanings. This section will define the term ‘public transportation system’ as it is used in this thesis.

As mentioned earlier on, the interaction of the public transportation system with other systems should be considered if indicators are to be developed that tie to concepts of sustainability. On the other hand, defining what a public transportation system is and its purpose, thereby establishing a boundary, helps to focus on the key relationships within and across this boundary. It is important to have a public transportation system well defined so that the level of analysis within the system, in this case the public transportation system, can be quite detailed and the activities outside or those that interact with it can be represented in very general ways. I would like to point out that this does not mean that any interaction with the outside should be ignored. It should be considered, but the level of detail, or depth, will be lower.

According to the APTA (2003) Fact Book, public transportation (or transit) is defined as "transportation by bus, rail, or other conveyance, either publicly or privately owned, providing to the public general or special service (but not including school buses or charter or sightseeing service) on a regular and continuing basis”.

A system, as defined by the American Heritage Dictionary, is “Any organized assembly of resources and procedures united and regulated by interaction or interdependence to accomplish a set of specific functions”. A similar definition for a system is used by Meyer and Miller (2001),
“A system is a group of interdependent and interrelated components that form a complex and unified whole intended to serve some purpose through the performance of its interacting parts.”

A combination of the above leads us to the following definition of a Public Transportation System: “Any organized assembly of resources, facilities, equipment and procedures united and regulated by interaction or interdependence to provide transportation by bus, rail, or other conveyance, either publicly or privately owned, providing to the public general or special service (but not including school buses or charter or sightseeing service) on a regular and continuing basis”.

As mentioned by Meyer and Miller (2001), ‘every system is part of another system. In this case, a ‘public transportation system’ is part of an ‘urban transportation system’ that, besides transit, also includes automobiles, trucks, and other modes of transportation such as taxi and school buses. And, the urban transportation system itself is part of a transportation system, which includes the facilities and services that allow individual travelers or goods to move from one place to another. To get a better understanding of the ‘urban transportation system’ and its main interactions with other systems that will be useful later on, the following section provides an overview of the history of public transportation in the US.

1.4 Overview of public transportation in the US

The following overview of the history of public transportation is derived from a paper written by Salvucci (2003a).

*Transit – the Panacea*

Public transportation emerged as a significant factor during the early beginnings of the 19th century (1800-1840), when dramatic growth in manufacturing attracted major job population growth. This resulted in overcrowding and created a demand for a commuting pattern: the ability to find less crowded housing at a distance from the work site, with public transportation providing the link to support that new pattern. Individual entrepreneurs provided the supply of public transportation. Along primary routes, potential profitability attracted many, providing much more frequent service and competition than other routes. In the absence of government regulation, efforts to control competition and conditions led to the formation of route associations. With some control of market entry, route associations could provide scheduled
service, increasing value to passengers. However, the potential use of violence to enforce rules increased the desirability of the government entering a regulatory role.

The introduction of the electric streetcars in the 1870’s produced a major improvement in transportation service. The higher capital requirements needed and increased economies of scale, led to further pressure for monopolistic production. As cities continued to grow, public transportation was seen as a service provided by the private sector, regulated by the public sector. As growth in cities led to increasing congestion on streets, still greater capital investments were generated to allow grade separation, involving public sector control through franchising, providing improved transit service and reduced congestion on streets for other users.

In the second decade of the 20th century, the emergence of the automobile, both as competition and congester of the streets, drove up the cost of producing public transportation, reduced its quality and reliability, and provided a mechanism for suburban growth that did not rely on private sector infrastructure investment. The new auto mode included the most affluent and influential citizens, so the auto congestion was generally not controlled. With the inflation caused by the Word War I, the fixed fare created a financial crisis for transit companies, just as new competition for space and riders came from the auto. In the 1920s, this combination of factors ended the period of urban growth dominated by public transportation.

In the post-1920 situation, the automobile captured an increasing role, while public transportation lost profitability, stopped expanding, and began a long period of decline. Beginning in the 1916-1930 period, automobile interests allied with US petroleum producers captured the gasoline tax as a source of revenue dedicated exclusively to highways. Zoning laws lowered permitted land use densities, introducing an early version of sprawl in which housing densities were too low to support public transit investment.

While the auto industry forged a strong alliance with government regarding fuel, infrastructure and land use regulation, public transportation was generally a private business with little government support, paying for operation and maintenance from farebox revenues. As ridership fell, shifting to auto competition, the combination of falling revenues and rising cost led to financial crisis. The industry generally responded by halting new investment, and reducing levels of service, further driving customers to the auto.
Transit remained somewhat more competitive for trips to the downtown. In the few cities where subways or elevated networks existed, public transportation could avoid the auto-generated congestion and retain credible mode share. From 1945-1970 adding low-cost mortgages for suburban homes at densities too low to support transit, further strengthened pro-auto public policy. Also, there was a continued treatment of transit as a private industry, to be 'subsidized' only in unusual circumstances. Toward the end of this period, transit made a transition from private sector to public sector.

With a relatively weak political base nationally, transit initially received capital funding to buy out the depleted private assets and begin to invest in equipment renewal, with operation and maintenance funding expected to come from the farebox. The theory was that if public funding could provide the capital investment, operation costs could be supported from the farebox. This theory was not attainable, and the effort to minimize operation subsidy led to a series of bad practices, including failure to maintain a state of good repair, reductions in frequency of service, and high fares. The initiatives of the 50s and 60s succeeded in converting what remained of public transit from the private to the public sector, and avoided total demise, but relative mode share continued to drop.

In the 1960s and 1970s, new political forces emerged which began to see transit as an important service deserving public support, much of it a reaction against the negative external impacts of growth relying on the auto as the main means of access. More recently, transit has continued to gain strength politically. In 1991, “ISTEA” reauthorized surface transportation with considerable authority for Federal highway funds to be used “flexibly” for transit with substantial new attention to the growth of the congestion issue. The near-total dominance of state highway departments on transportation investment was modified institutionally by the requirement to establish “Metropolitan Planning Organizations” (MPOs), composed of local and metropolitan officials.

The new flexibility, and institutional change, has seen substantial shifting of Federal “highway” funds to transit in many metropolitan areas, indicating substantial policy and political strength in transit. Against this backdrop of relatively successful gains for public transportation, the actual results in travel behavior are disappointing. While overall transit ridership losses have reversed, the mode share for transit has continued to fall and the auto continues to dominate the
transportation system. Opponents of pro-transit policies point out that labor costs have captured a disproportionate share of increased available funding. Other advocates for transit include those that believe the private sector needs a greater role and those that argue that bus should be favored rather than rail.

Discussion
The overview of the history of public transportation by Salvucci (2003a) provides us with several lessons. This includes the dominance of the auto in the transportation scene, and the importance of a powerful coalition. Other issues that arise are how a change in technology can disrupt the normal course of action, for example the introduction of steel wheels on rail that allowed for a large increase in vehicle size, payload, and capacity and the introduction of the automobile that changed the role of transit. Note that (radical) changes in technology often also result in a change in institutional structure such as the need for the government to franchise the construction of rails in the public street and the coalition formed between the automobile industry and the gasoline industry.

Important issues or systems with which the public transportation interacts that can be derived from the text by Salvucci (2003a), are issues related to land-use, also called the ‘urban activity system’, the automobile, and the environment. Also important appear to be the role of the workforce, the financial situation, and the governance or institutional structure. The issue of land use is a recurring theme throughout history and might need some background information.

The terms “urban activity system” or “urban land use” refer to the spatial distribution of people and activities within a metropolitan area. In general, people and activities will choose among locations based on a location’s attractiveness for a particular type and scale of activity and on the location’s accessibility to other activities. A location’s attractiveness depends, among other things, on the price or rent associated with the buildings and the land being bought and sold. In general, it is expected that these rents will decline as one moves farther from the city center (Meyer and Miller, 2001).

A location’s accessibility depends on the transportation system. Transit planning is particularly linked to the land-use question for two reasons. First, conventional transit is viable only within certain types of land-use/urban forms. In particular certain minimum levels of densities are
required before fixed-route transit services can be cost-effectively operated. Second, transit is often viewed as part of the solution with respect to urban sustainability (Meyer and Miller, 2001).

Concluding, this section introduced several factors that interact with the urban transportation system such as that of land-use and the automobile. These and an idea of the history of public transportation in the US are important to keep in mind when exploring performance indicators that measure and evaluate the effectiveness of structural reform of the Chicago public transportation system in later chapters. Especially the interaction between public transportation and the automobile and land-use are important to include. Figure 1 below shows some of the interactions between the transportation system (including but not limited to public transportation) and the urban activity system.

Figure 1: Urban activity and transportation systems interaction.

1.5 Structural reform

Organizational theorists have defined structure as the configuration of relationships with respect to the allocation of tasks, responsibilities, and authority (Simmonds et al., 2003). Organizational structure institutionalizes how people interact with each other, how communication flows, and how power relationships are defined.
The term "structure" refers to both, the internal "composition" of a whole or system, as well as to the interactive relations between the system's components. Applied to Chicago, this means both the internal composition of the public transportation system as well as the interactions between the different organizations or institutions that are part of this system. Thus, this research does not focus on the internal structure of an organization, but rather on the relationships between the different organizations and/or institutions that make up the system that is being studied.

1.6 Sustainability in the context of a public transportation system

The most well known definition of sustainability, focusing on sustainable development, can be found in the report Our Common Future, published in 1987 by the World Commission on Environment and Development (WCED), also known as the Brundtland Commission as it was headed by G.H. Brundtland, the prime minister of Norway. This report stated that: “Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Although this definition has become widely publicized, the term sustainability is not limited to one precise definition.

Sustainability in the context of public transportation systems refers to a well functioning system over a longer period of time. As mentioned earlier, when structural reform happens within public transportation systems, this often occurs without clear goals and measures of effectiveness, which allow a crisis to recur more easily. When asking what set of indicators evaluate and measure the effectiveness of structural reform in such a way that the new structure will function over a long period of time, it is important to include indicators that represent both short and long term issues. Focusing on sustainability also means that issues should be studied that are both directly and indirectly related to public transportation systems. Examples of such issues are the political environment, air quality, planning, finance, and car ownership. More detailed information on the way sustainability is viewed and used within the research will be discussed in the following chapter.

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2 Source: Economic Geography Glossary: http://faculty.washington.edu/krumme/gloss/s.html
1.7 Layout of the thesis

The following chapter discusses in further detail some issues that were mentioned shortly in the introductory chapter. These include more background on the historical use of performance indicators and a discussion of the concept of sustainability. Chapter 3, takes a side step and looks at the electric utility industry in the US in an attempt to find any linkages or suggestions for structural reform that may be applied to public transportation systems. Chapter 4, based on the literature review, attempts to provide an analysis of which data is currently available that can be used as performance indicators and which data that was discussed during the literature review is not available.

Chapter 5 provides detailed information on the Chicago public transportation system, necessary to understand the problems that are currently being perceived and that may lead to structural reform. Chapter 6 brings together the knowledge collected to that point and uses this to identify performance indicators and ways in which they may be implemented. Finally, chapter 7 provides conclusions and recommendations.
2 Literature research

2.1 Introduction

The first step in developing performance indicators is to find out if prior research has been done on indicators that measure the performance of public transportation systems, specifically the historical use of performance indicators in the transit industry.

Besides understanding the historical use of performance indicators, there are other issues that should be understood and considered when developing performance indicators. The first is that performance indicators must be linked to objectives in order to be successful. Pickrell and Neumann (2001) support this by saying “To influence decision, performance measures must be linked to objectives, and integrated into the planning, management, and decision-making processes of an agency”.

The second part of the statement points out that performance measures must not only be linked to objectives but also focus on integration into the system. Therefore, this chapter will identify a number of issues, including implementation and data availability that should be considered during identification of performance indicators. Of course, indicators should also reflect long-term changes in system usage or condition and therefore be tied to concepts of sustainability. This concept will be further studied in this chapter.

This chapter focuses on performance indicators for public transportation systems in general. Detailed information on the Chicago public transportation system, its problems, and the application of the information found in this chapter will be discussed in a later chapter.

2.2 Historical use of performance indicators

In public transportation systems, performance indicators have usually been used for reporting purposes, decision-making and self-improvement, and communication of results to others outside the agency (TCRP, 2003).

The use of performance indicators in public transportation systems goes back about 50 years, to the beginning of comprehensive transportation planning in the United States. At that time,
those proposing the measures were primarily civil engineers or those with responsibility for operation. According to Meyer (2001), many of the measures currently used to monitor system performance are similar to those proposed 50 years ago, "The measures have become entrenched as current and accepted practice for the monitoring of system performance, even though they were originally used for alternatives evaluation or design standards".

At the moment, the need for performance indicators in public transportation has not declined and they continue to be used and developed. For example, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century (TEA-21) directed a focus on performance by articulating planning factors and encouraging management systems while many state legislatures moved toward performance-based budgeting. Factors that encourage the use of performance indicators in transportation planning and programming are the desire to increase the accountability of public expenditures, the need to communicate results to customers and government to get their support for investments, and responsiveness to federal and state statutes.

The historical background on how performance indicators were intended primarily for alternatives evaluation or design standards is consistent with literature found which focuses heavily on performance indicators for transit agencies to monitor their own system and route performance. But, as the industry is shifting focus from the use of an individual company's owned assets to a focus on the quality of service to the customer, Pickrell and Neumann (2001) observe that many transportation agencies have begun to introduce explicit transportation system performance measures into their policy, planning, and programming activities.

The use of performance indicators and what they should measure is evolving into more than just design standards for a particular operating agency. The focus of this research is not on transit agencies but on public transportation systems as a whole, including their interactions with other systems. Therefore, this chapter continues the evolving thought that performance indicators should measure more than route performance. It will attempt to cover performance indicators in a broader sense.
2.3 Performance indicators – different viewpoints

An attempt to cover performance indicators in a broader sense, must consider the different stakeholders involved in a public transportation system.

According to Tomazinis (1975) "It seems that for such a complex, socially important, and publicly supported system as the urban transportation system, the points of view of its users and the points of view of society at large, and that of the government in particular, be explicitly and comprehensively represented in the basis framework of each study and in all its measurements and evaluations". Tomazinis (1975) distinguishes four points of view; these are that of the operator, user, society at large, and government at large. The interaction between these four stakeholders is represented in figure 2.

![Diagram showing four viewpoints in an urban transportation system](source: Tomazinis (1975).)

Figure 2: Four viewpoints in an urban transportation system.

A recent TCRP (2003) report also stresses the existence of different perspectives. It argues that the performance and delivery of transit service depends on the perspective from which it is seen. The report considers the old adage “where you stand depends upon where you sit” applicable when determining which performance measures are most valuable. The different perspectives according to the report are that of the customer, community, agency, and driver.

Both Tomazinis (1975) and the TCRP (2003) report include the customer/user, the agency/operator and the society/community as stakeholders. Tomazinis (1975) views the government as an additional stakeholder. The government is included because of involvement of a government at different levels with the operations and with improvements of urban
transportation service in general. In addition, the government is asked to provide grants, subsidies, and loans and has explicit objectives concerning society.

The TCRP (2003) report includes the viewpoint of the driver. Even though this actor and the inclusion of its viewpoint may initially seem of less importance, it is indeed a critical factor to the success of the system. First, the morale of drivers, or employees, affects the quality of the service and through this the decision of customers to use the system. Second, employees have political power that can be used to influence and guide decisions that affect the system.

In my opinion, it is important that both the government and driver are included as main stakeholders. The viewpoint of society can be omitted because it is either directly or indirectly included in the views of the customer, the government, and the employees. Concerning the customer, this can be seen as two separate viewpoints; the direct customer that uses the service and the indirect customer referred to as the ‘business’ who profits from the people that use the service. This leads to five viewpoints that should be considered when developing performance indicators. These are the government, operator/agency, customer (direct customer), business (indirect customer), and the employees/driver as shown in figure 3.

![Figure 3: Major viewpoints in a public transportation system.](image)

When setting up indicators that can be used to evaluate and measure the performance of a public transportation system one should make sure that the five viewpoints identified are represented in the final set of indicators, and that no one group is underrepresented. It is important to realize that the viewpoint in which one stands relates not only to how performance is viewed, but also to the goals that one has for structural change.
2.4 Requirements for long term success

Goals and objectives

In the development and identification of performance indicators, picking the right ones is a key element. As mentioned earlier on, performance indicators must be linked to goals and objectives. This way, success on the indicators will lead to success of the goals and objectives. Dalton et al. (2001), who in their research on transportation data and performance measurement determine four stages of performance measurement, agree with this observation. Of the four stages listed, the first step is the identification of goals. In addition, a conference on “Performance Measures to Improve Transportation Systems and Agency Operations” held in 2001 concluded that “Experience shows the importance of first identifying the goals and objectives to be addressed by the performance measures”.

The goals and objectives can be seen in both general and specific terms. The primary goal is to drive the performance of the new structure towards achieved goals and objectives (for the agency) and to monitor performance (i.e. for the government). Case specific goals and objectives related to this will be discussed in a later chapter. A general goal is the requirement that the indicators reflect long-term changes in system usage or condition. This is related to the concept of sustainability.

Concept of sustainability

But, what exactly is sustainability? An answer to this, depends on the context; sustainable for whom or of what. Some ways in which sustainability may be framed include sustainable development, sustainable growth, sustainable ecology, etc. A general and widely publicized definition related to sustainable development is that of the Brundtland report, published in 1987, where sustainable development is defined as that which “meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

In addition to a definition for sustainable development, the report published by the Brundtland Commission contains a first articulation of a framework to be used in evaluating a proposed action or initiative that has the goal of being sustainable (Edwards, 2000). The concept is based on simultaneous structural interaction of three fundamental criteria: environment, economy, and
equity; also referred to as the three E’s and represented in a triangle. This framework is now used by and has been incorporated into the thoughts of academics, government, and industry.

The three pillars of the triangle may differ among its users depending on the application, for example, environment can be replaced with ecology and equity with equality. The three concepts used here are environment, equity and economy and are represented in figure 6. These three features are influenced by both public and private sector initiatives and policies.

![Figure 4: Three features of sustainability.](image)

In this thesis sustainability is framed within the context of public transportation systems, in particular that of Chicago. This is related to how public transportation contributes to a sustainable environment and economic growth but also in terms of financial sustainability. The adoption of triple sustainability (environment, equity, and economy) to public transportation can be argued as followed:

- **Economy** – This concept recognizes the importance of providing long-term employment without jeopardizing the health of ecosystems. Having a healthy environment, while simultaneously providing the basis for a dynamic economy that will endure for an extended period, are viewed as complementary, rather than conflicting, goals (Edwards, 2000). Natural capital, made up of resources, living systems and ecosystem services, are considered as important for economic development as the more conventionally recognized forms of capital (Edwards, 2000). Applied to an urban transportation system this means, among other things, contribute to accessibility in general and to provide accessibility directly for customers. It also means reduced congestion for trucks and autos.

- **Equity** – This concept refers to the understanding that the well being of an individual is dependent on the well being of a larger community and vice-versa; a fair and equitable distribution of resources is recognized as essential for long-term viability of a group as a whole (Edwards, 2000). At the level of a country or state, this concept addresses the fair
distribution of such resources as food, affordable housing, health care, and education. Applied to public transportation this means accessibility for those without cars and those with physical disabilities. It also means reasonable access to the public transportation system throughout the region. One of the reasons for public transportation is to enable individuals from different income levels to move around and go somewhere without needing a car. Equity also means availability of jobs working in the system and fair opportunity to compete for those jobs.

- **Environment** – This concept is based, among other things, on the fact that ecosystems have built-in limits on the nature and amount of human impact they can sustain. In relation to urban transportation, consideration of this concept means reduction of auto adverse impacts on air, habitat and accessibility. Public transportation and walking are seen as playing a key role in improving environmental sustainability, and to mitigate the environmental costs of auto orientation, by providing accessibility options which provide individuals with alternatives to the use of the automobile, and can over time influence, or at least support, patterns of development that allow for high amenity living standards with less impact on the environment³.

An example of the adoption of the sustainability concepts and applied to transportation can be found in the mission statement of the Illinois Department of Transportation (IDOT); “to provide safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity, and demonstrate respect for our environment” (IDOT, 2004).

Other issues of importance, in addition to those listed for triple sustainability, are political (governance) and financial issues. According to Pickrell and Neumann (2001) “Decision making related to planning and programming is an inherently political process rather than primarily a technical one, with plenty of ‘wheeling and dealing’ going on, both in plain sight and behind the scenes”. Over time, cities, regions, and states develop their own unique processes, in response to the needs and particulars of each system and constituency. Factors such as the composition of decision-making boards, leadership and management styles, political appointments, and term limits all contribute to a complex decision-making process that reflect the history and culture of an area. Details on the political issues related to Chicago will be discussed in a later chapter.

While Pickrell and Neumann focus on politics related to project selection, similar logic and reasoning can be applied to service distribution and pricing. Even though politics and political power can have connotation of advantage for the powerful or skillful, political sustainability must have adequate equity to avoid disruption of the service. Finally, it can be seen that while precise outcome oriented performance indicators, consistently collected over time, are most useful to monitor triple sustainability for policy makers and the public, political (governance) and finance issues require a more process oriented approach.

Other issues

Besides the three pillars introduced above and the mention of political and financial issues, other ideas exist that are not directly identified as representing issues of sustainability, but include measures that are important for long term success.

Research by Altshuler (1979) identifies 19 criteria that are frequently mentioned as bases for evaluating the current system of urban transportation and strategies for improving it. According to Altshuler “they entail aspects of personal mobility or external effects directly related to the functioning of the urban transportation system and do not include such ‘pork barrel’ criteria as the number of jobs generated by transportation investment expenditures”. Note that what Altshuler sees as ‘pork barrel’, others may see as jobs and equity. The nineteen criteria are arranged into 3 categories and are shown in the table below.

Table 2: Criteria identified by Altshuler to evaluate urban transportation systems.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem criteria</td>
<td>Criteria with respect to which current system performance causes a serious problem calling for public action.</td>
<td>Air quality, equity, safety, congestion, land use impact, and noise.</td>
</tr>
<tr>
<td>Other key evaluation criteria</td>
<td>Criteria that become focus of controversy when improvement actions threaten to generate significant increases in their magnitude.</td>
<td>Public dollar costs, user dollar costs other than tax payments, and neighborhood and environmental disruption incidental to public works activity.</td>
</tr>
<tr>
<td>Success criteria</td>
<td>Criteria with respect to which current system performance is generally considered good, or at least sufficiently adequate as to be low-priority justifications for new public initiatives.</td>
<td>Reliability, speed, convenience, flexibility, personal security, comfort, consumer freedom, privacy, and recreation.</td>
</tr>
</tbody>
</table>

Source: Altshuler (1979).

In addition to the categories above, other sets of categories exist and have been identified by the TCRP (2003), Pucher and Lefèvre (1996), Cambridge Systematics, and the International
Association of Public Transportation (UITP). Although a great many other sources exist with categories required for evaluating urban or public transportation systems and related to long-term success of these systems, many of the same criteria appear. Therefore, the number of sources has been restricted to those mentioned above. The categories distinguished by the different sources are listed in table 3.

Note that some sources list their categories more specific than others. Also, some are directly and others are indirectly related to public transportation systems. For example, the criteria identified by Altshuler (1979) are used for evaluating the urban transportation system, where the urban transportation system includes, besides transit, automobiles, trucks, and other modes of transportation such as taxi and school buses. In contrast to this, the categories identified by the TCRP (2003) report are set up for transit agencies, Pucher and Lefèvre (1996) focus on urban transport problems and the UITP focuses on cities in general.

Table 3: Categories required for sustainability or success of a system.

<table>
<thead>
<tr>
<th>Source</th>
<th>Categories required for sustainability or success of system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambridge Systematics</td>
<td>Economic development, sustainable environment, and a vital economy.</td>
</tr>
<tr>
<td>Triple sustainability</td>
<td>Environment, work, and economy.</td>
</tr>
<tr>
<td>Altshuler</td>
<td>- Category 1: Air quality, equity, safety, congestion, land use impact, and noise.</td>
</tr>
<tr>
<td></td>
<td>- Category 2: Public dollar costs, user dollar costs other than tax payments, and neighborhood and environmental disruption incidental to public works activity.</td>
</tr>
<tr>
<td></td>
<td>- Category 3: Reliability, speed, convenience, flexibility, personal security, comfort, consumer freedom, privacy, and recreation.</td>
</tr>
<tr>
<td>TCRP Report 88</td>
<td>Availability, service delivery, community, travel time, safety and security, maintenance and construction, economic, capacity, paratransit and comfort.</td>
</tr>
<tr>
<td>Pucher and Lefèvre</td>
<td>Congestion, environment, energy, safety, finance, and equity.</td>
</tr>
<tr>
<td>UITP – Millennium Database</td>
<td>Characteristics of the metropolitan area, supply indicators, mobility indicators, public transport productivity, transport financial cost, transport externalities indicators, and public/private transport balance indicators.</td>
</tr>
<tr>
<td>Other</td>
<td>Political</td>
</tr>
</tbody>
</table>

2.5 Identification of performance indicators

The previous section identified goals and objectives, in the form of different categories, related to a sustainable and in the long term effective public transportation system. The large number of categories demonstrates the need to select indicators from those choices available. It is better to have a few indicators that work well and are clear, measurable and simple, instead of a long list. As Pickrell and Neumann (2001) mention, “All other things being equal, fewer rather than more measures is better, particularly when initiating a program”.

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Other issues to consider, including those already mentioned, when refining the available pool of indicators can be divided into three categories:

1. Issues to include in the identification of potential indicators
2. Issues to consider when narrowing down the pool of potential indicators
3. Issues to consider when refining the selected indicators into something measurable

**Issues to include in the identification of potential indicators**

- Sustainability measures – The previous section listed some broader societal measures that are necessary to achieve a sustainable public transportation system.
- Think outside the system – Public transportation interacts with other systems. Even though included in some way in the sustainability measures, interaction with other systems should be considered.
- That which is going well - Indicators should be included that focus on things that are going well, because this might change too, especially over time. Maintaining good performance is as important as to remedy and improving poor performance.
- Maintain & expand – Performance indicators should capture two things: not only how to run or continue what you have (the service today), but also to help and guide recapture or expansion of the transit system. Concerning maintenance, it is important that transit systems maintain a good state of repair. Failure to do so is a problem across the US as a response to budget inadequacy. Concerning expansion of the system, as the overview of the history of public transportation by Salvucci (2003a) demonstrated, public transportation has been dominated for approximately 75 years by the automobile. Performance indicators should focus on capturing how to run what you have (service today), but also recapture or expand the transit system.
- Case specific - The performance indicators will need to be case specific. Specificity is also required to facilitate continuous monitoring and self-monitoring. More detail on the case itself is available in a later chapter.

**Issues to consider when narrowing down the pool of potential indicators**

- Data availability - Consider which data is already available, for example federal requirements, and which data is not yet collected or available.
- Is it measurable? - Meyer (2001) argues that one should be careful when trying to find indicators for such issues as sustainability. The difficulty of indicators that focus on broader societal outcomes is that they face significant challenges in definition and application. As a
result they are often difficult to measure. At the same time some difficult to measure attributes may be among the most important, so it is important to develop a measurable “proxi” rather than ignoring difficult to measure attributes.

- Time lag - Meyers (2001) mentions that when including long-term issues there is often a time lag associated with the eventual outcomes, adding complexity in establishing cause and effect. For example a time lag exists in the relationship between transportation operation, private investment, and land use changes. This time lag could affect decision makers’ interest in performance measures.

- Co-optimize vs. trade-off – If possible chose a set of indicators that ‘co-optimize’ instead of those that include trade-offs. Recognize disagreement or difference between ‘tradeoff’ and ‘win-win’ situations. It is better to co-optimize than use a tradeoff. Also realize that in win-win situations technology often plays an important role.

- Thorough analysis of indicators – Performance indicators that look rational might create different incentives than originally intended. An example is ‘ridership’; although it could be considered a useful measure of how many people use the system, it does not encourage expansion of the system into rural areas.

- Implementation – Once performance indicators have been identified it is equally important to implement them into the system. Identifying performance indicators when they are not used or when the data is not collected, is useless.

**Issues to consider when refining the selected indicators into something measurable**

- Data availability - Consider which data is already available, for example through federal requirements, and which data is not yet collected or available. A review of existing and systematically collected databases of urban transportation systems in the US can be found in the next chapter.

- “Nesting” of indicators – Each performance indicator might be used to identify many more detailed (or sub) measures for management within the organization. It is important to realize that general goals need to be translated to something specific and applied to the organization, not only at the management level but also at the levels below. Within the transit agency the indicators will be broken down even more, within departments and units.

- Outcome oriented vs. process oriented – Process oriented indicators do not have a specific direction and do not focus on the outcome itself. Examples of process-oriented indicators are those used by MPO’s and the National Environmental Policy Act. Outcome oriented indicators have a goal or direction towards which they are heading. Examples of outcome-
oriented indicators are the interstate highway (cost to complete), Clean Air Act, and Sect. 4f (you cannot use a park to build a highway). In order to be successful, not only in evaluating the system, but also in guiding the system in the long-term, the selected indicators for Chicago should be outcome oriented. Also, to change the trend of automobile dominance more room should be allowed for public transportation. Setting a direction and developing outcome-oriented indicators is the only way to do this.

2.6 Conclusion

This chapter focused on the historical use of performance indicators and how recently, the focus on indicators is shifting to include the customer as well as interactions with other systems. This led to the question of which stakeholders that should be considered in the performance indicators; these include the government, operator, customer, business, and employee. The need to link performance indicators to goals and objectives brought in the concept of sustainability and a study of the different frameworks that exist. This led to the realization that important categories that little or no sources relate to are that of political, financial, and policy issues. Finally, issues are listed that should be considered when narrowing down the pool of potential indicators and when refining the selected indicators into something measurable.
3 Lessons from the U.S. Electric Utility Industry

3.1 Introduction

Before heading to the chapter on identification and implementation of performance indicators it might be useful to step back from the study of public transportation systems and focus on the electric utility system in the U.S.

In most US and European contexts, public transportation is produced by public sector monopolies, with substantial subsidy justified for a combination of equity, environmental, and economic arguments. Currently, public transportation systems are undergoing changes because the public monopoly transportation systems have come under criticism for a variety of problems. Examples of these problems are high subsidy costs, poor service quality, unequal levels of service within the district, ‘producer capture’ by labor unions, poor management and maintenance priorities, and politicized management. Competition is introduced in an attempt to deal with some or all of the problems. The way competition is introduced differs among the different public transportation systems.

Previous research under the direction of Prof. Nigel Wilson has developed the concept of separating the “provision” of public transportation, that is planning, route structure fare policy (and quality monitoring) and subsidy support, which is retained in a public sector organization, from “production” of the service, which may be procured in a variety of ways (public monopoly, private monopoly regulated by the public “provision” organization) “threatened competition” for the market, actual competition for the market, and competition in the market. Each of these possibilities raises different problems in removing the planning and marketing of the “provision” group from the immediacy of understanding of market connections to which the provider has access. In the organization of public transportation, efforts to introduce competition by separating ‘provision’ and policy-making from ‘production’, have been pursued with reasonable success in London bus operations, Buenos Aires rail systems, in Boston with commuter rail, and in many locations with paratransit.

The main reason for looking at the electric power sector is the hypothesis that electric utilities have a longer history of dealing with the above questions, and may provide useful lessons of what has worked, and what has failed, that may assist public transportation institutional structure reform. Thus, the idea is that lessons can be learned from regulation activities in this
sector. Related to this is the idea to look further into that part of history where, in some cities, electric utilities and public transportation were provided by a single company or organization.

3.2 Synergies between electric utilities and public transportation

At one point in time, holding companies existed that specialized in more than one service. Examples of such companies are the Louisiana Power and Light Company in Louisiana and the Pudget Sound Power, Light & Traction Company in Seattle. Even the names of these companies reveal their specialization in more than just one service. Some background on the companies that provided both electricity and public transportation in Seattle, Houston and Louisiana, is provided below.

Seattle – Around 1900 the banker Jacob Furth through the cartel of Stone & Webster bought up 22 private streetcar lines, including Seattle Electric, hereby controlling public transportation in the city. Later Stone & Webster acquired the area's first hydroelectric plant and early interurban railroads. It folded Seattle Electric and other companies into a new holding company called Pudget Sound Power, Light & Traction Company. Reformers resented this private monopoly over electricity and public transportation. In 1934 federal anti-trust regulators pulled the plug on Stone & Webster's utility cartel and reorganized the firm under a local board of directors.

Houston – In 1896 the Houston City Street Railway was sold and reorganized as the Houston Electric Street Railway. After another receivership in 1901 the street railway is sold and reorganized as the Houston Electric Co. This new organization purchased its last new streetcars in 1927; the last streetcar ran in 1940.

New Orleans, Louisiana – As demand for lighting increased, it became apparent that better and more economical electric service could be provided if a single company supplied an area. As merged companies became larger, they began to purchase the smaller companies. During the purchase of small, isolated systems, it was the electric properties that were most sought after. However, the acquiring companies were frequently required to buy affiliated water, ice, dairy, bottling, and other businesses in order to obtain the electric properties. Other unrelated businesses that were acquired included streetcars.
In New Orleans, with more than 200 different gas, electric, and streetcar companies, the utilities were financially unstable. In 1922 the City Government passed an ordinance to bring a new company and the city into a partnership. The entity created was called the New Orleans Public Service Inc. (NOPSI) and quickly after acquired the New Orleans Railway and Light Co. The NOPSI was at one time unique in owning 3 utilities; electric, gas, and transit.

The search for synergies of owning multiple utilities provided the names of several cities and companies that were responsible for more than one service of which New Orleans, Seattle and Houston are mentioned above. When reading the history of these companies, it seems that different reasons existed for the mergers. The reasons for mergers between utilities are often mentioned indirectly. One synergy that seems to be implied indirectly is mentioned shortly in the history of the electric utility industry. This is providing electricity that can be sold to citizens and also used for electric streetcars. Especially at that time, economies of scale were important in decreasing the electricity costs and could have played an important role in the reasons for a merger. Another source mentioned that “a final possible source of investment in the trolley system disappeared with the Public Utility Holding Company Act which forbade the ownership of transit systems by electric utilities”.

However, whatever synergies might have existed in the past between electric utilities and public transportation, the 1935 Public Utility Holding Company Act (PUHCA) broke up the existence of multilevel holding companies. The act required utility holding companies to specialize in one service and relinquish their unrelated properties, such as city transit systems and natural gas production companies. PUHCA was designed to maintain the focus of the holding company on the core utility business and limit financial risks to customers. Enactment of PUHCA in 1935 was sought to protect investors, consumers, and the public from the financial abuses of utility holding companies.

3.3 History of the electric utility industry

In order to draw any lessons from the history of the electric utility industry that can be applied to public transportation, some major points in the history will be highlighted. The modern electric utility industry began in the 1880s with the opening of Thomas Edison’s Pearl Street electricity

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generating station. The Energy Information Association (EIA, 2000) has divided the history of the electric utility industry, from the 1880s till 1984, into a number of different periods. These are the ‘Beginnings’ (1882-1900), the ‘Era of Private Utilities’ (1901 – 1932), the ‘Emergence of Federal Power’ (1933-1950), the ‘Utility Prosperity’ (1951-1970), and the ‘Years of Challenge’ (1971-1984).

In the first period from 1882-1901 electric utilities spread rapidly. Municipally owned utilities contributed to about eight percent of total generation and privately owned utilities controlled the rest of the industry. The second period, also called the ‘Era of Private Utilities’, is characterized by growing economies of scale as well as the beginnings of State and Federal legislation. As a result of growing efficiencies, small private and municipal lighting and railway or power companies merged with or were absorbed by larger and more efficient private multi-service systems. Private utility holding companies began forming and expanding. At their peak, the 16 largest electric power holding companies controlled more than 75 percent of all U.S. generation (EIA, 2000).

The growth of utility service areas, beyond city boundaries, brought State regulation of electric utilities to ensure that the monopolistic utilities did not take advantage of their customers. In the early 20th century, managers of investor-owned power companies reached a consensus with politicians and reformers. Electricity supply companies became viewed and won designation as natural monopolies, which gave them the right to sell electricity in a noncompetitive market. The consensus also called for the creation of state regulatory commissions to ensure that both parties fulfilled their commitments, and protected customers from monopoly abuses (Hirsh, 1999).

In this period, tension existed between advocates of public and private utility companies. To end this, the Federation commission offered a solution that supported either municipal or private ownership of utilities. It argued that some cities should own their power systems, while others should allow private ownership. In either case, the utility companies should be subject to ‘public regulation and examination under a system of uniform records and accounts’. To ensure this, state regulatory commissions were set up to control electric utilities for the public’s well being. (Hirsch, 1999)

Though not anticipated by most parties, the system created by the monopoly consensus allowed utility managers to acquire substantial political and economic power. Executives
adapted the mechanisms of regulation to serve their own interests, and gained influential allies in finance, industry, and academia. Shrewd power company executives realized that state oversight meant governmental acceptance of their companies as natural monopolies, which brought with it a host of benefits. One of these benefits was that regulation reduced the nature of financial risk and offered a sense of permanency to investors and businessmen. This resulted in a positive investment environment, which was important to fund construction and help to continuously lower the prices of electricity, keeping the customers happy. Moreover, by exploiting a technological strategy that continuously brought down the price of electricity, power company executives muted criticism and reinforced their elevated status. By doing so, managers succeeded in controlling much of the environment in which they operated. (Hirsh, 1999)

The period from 1933-1950 is referred to as the emergence of federal power. During this period the extent of the utility industry's efforts to influence public opinion became widely known. In addition, financial abuses within the industry became known. The financial leveraging that profited holding companies during good times, caused their downfall during the Depression. To prevent abuses in the future, Congress passed the Public Utility Holding Company Act in 1935. The law abolished most holding companies except those providing economies and efficiencies to geographically contiguous utilities. It limited the way utility companies could be organized, and created the Security and Exchange Commission that subjected utility financing activities to close inspection.

The period from 1951-1970, that of 'Utility Prosperity' marks a time of prosperity for the electric utility industry. Demand for electricity grew, while electricity prices continued to fall. In addition, the arrival of commercial nuclear power held the promise of a prosperous future. (EIA, 2000)

An important period in the history of the electric utility industry is that from 1971-1984, also marked as the 'Years of Challenge'. In the beginning of this period, the electric utility industry moved from decreasing unit costs and rapid growth to increasing unit costs and slower growth. Major factors affecting the electric utility industry during this period were (Hirsch, 1999):

- **Stop of technological improvements along traditional lines** – The utility industry hit a barrier to technological improvement resulting in utility companies no longer able to reduce electricity prices.
- *Energy crisis of 1973* – The energy crisis caused power prices to increase and highlighted the ‘wasteful ways’ in which electric utilities produced energy.

- *The environmental movement* – Critical thinkers began to focus on the relationship between energy use and environmental damage and create awareness of these problems. Environmental legislation increased the costs of building and operating electric utility power plants.

While the industry was tempting to recover the Public Utility Regulatory Policies Act (PURPA) was enacted in 1978. President Carter wanted Americans to regain control over their energy and economic future. The original goal was to eliminate the wasteful use of electricity and stimulate the production of power in nontraditional ways. In pursuing these goals, PURPA removed barriers that had long hindered entry into the generation sector, giving special privileges to cogeneration firms and companies that produced electricity from renewable resources, also referred to as qualifying facilities (QF’s). With PURPA Congress required utilities to let independent producers onto their grid and encourage alternative forms of renewable energy. With this, PURPA became a catalyst for competition in the electricity supply industry. EIA (2000) and Hirsch (1999)

Though offered significant inducements, potential QF’s initially moved slowly to take advantage of their rights. They did not feel confident that they would benefit from the legislation. However, soon qualifying facilities exploited the generous provisions of PURPA. Given favorable treatment, QF’s enjoyed the ability to build power plants and sell to a guaranteed market at attractive rates. This was the first type of competition that utility managers had to face. By removing the barrier for QF’s to entry the market, PURPA deprived the utility managers of their control over the industry’s forecasting, planning, and operation functions (Hirsch, 1999).

Currently, the U.S. electric utility industry is undergoing an even bigger change in the way it delivers electricity. The industry is being deregulated and opened to competition, giving consumers the power to choose their electricity provider in much the same way they choose telephone carriers. Congress opened the system to competition in 1992 with the National Energy Policy Act, which allowed power producers to compete for the sale of electricity to utilities. In 1996, the Federal Energy Regulatory Commission (FERC) issued what would
become one of its most famous orders; order 888, which required utilities to open their transmission lines to competitors\(^7\).

In reaction to order 888 several states including New Hampshire, California and Massachusetts launched a pilot program allowing competition. Among the states that have enacted electricity deregulation plans, results are mixed. Pennsylvania’s deregulation experiment, enacted in 1998, is considered a success; nearly 500,000 consumers, more than 11 percent of ratepayers, chose to leave their utility company as of Oct. 1999. However, in California, which in 1996 became one of the first states to enact an electricity restructuring plan, the results are different. In the summer of 2000, limited power supplies and increasing demand caused an increase in the wholesale price of power throughout the state. The problem grew in the winter of 2000/01, when the state’s electric utilities faced a financial crisis and consumers were met with electricity shortages and skyrocketing prices\(^8\).

The price increases and problems in California intensified criticism of deregulation and have raised questions about the viability of deregulation. At the moment, it is still an open question whether electricity deregulation delivers the benefits, including lower prices and more services, its supporters argue. Even among members of Congress there is little consensus and much debate on the topic electricity deregulation. The debate during 1999 and 2000 focused on whether the FERC or the states should be responsible for overseeing a deregulated system\(^9\). The fallout from California’s failed deregulation experiment has not helped the prospects for passage a national electricity deregulation act and while various lobbying groups are at work, the debate continues. One issue people often overlook in the debate is what the industry would look like now, if it had stayed in the PURPA mode.

### 3.4 Potential lessons from the electric utility industry

Similar to the history of the Chicago Public Transportation system, the history of the electric utility industry shows that power and finance are two issues that play an important role in the events that occurred. In addition to these two, the history of the electric utility industry also clearly underlines the importance of having a vision for the industry, meaning to be aware of what is going on and what might happen in the future.

In several sources of literature it is stressed that power company executives did not seem aware of several events that together broke down their power. These include the inability to reduce electricity prices by technological improvements along traditional lines, and the power of the environmental movement. Also, when PURPA was enacted in 1978, many did not foresee the consequences of opening competition into the generation sector.

Other issues from the history of the electric utility industry that might be useful include:

- Monopoly vs. competition
- Role of technology
- Quality and quantity of personnel

**Monopoly vs. competition**

In the past, electric utilities were viewed and designated as natural monopolies. Competition had proven unsuitable because it was unable to yield the lowest cost and best service to the customers. However, “investor-owned utilities failed to serve a large segment of potential users in rural areas until after the federal government stepped in during the 1930s” (Hirsch, 1999). To solve the control over natural monopolies, regulatory commissions were installed as a new part of government.

The regulatory commissions were government servants (at the state level) and in most cases appointed by the governor, except for 5 states in which they are elected. Today regulators are more visible and this has attracted better people to the regulatory commissions. The states with the best regulators are: Massachusetts, Maine, Wisconsin, California, and New York; those in California and NY get paid a lot. When asked whether a correlation exists between size of staff and quality, the answer is yes\(^\text{10}\). A large staff shows that the government is committed to make it work. Also, when you have the money to hire people, you can hire better people.

Positive issues of the regulatory structure, according to R. Tabors, were the concept of “RPI-X” and that of private money with hedged risk. RPI – X or ‘performance based regulation’ turns a guaranteed rate of return mentality, into an incentive to minimize cost because this will result in a higher profit. RPI is the retail price index and X the productivity coefficient; where the regulator determined the X. This concept was first applied in the U.K. The concept of ‘private money with

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\(^{10}\) Meeting with R. Tabors from Tabors Caramanis & Associates, held on November 18, 2003.
a hedged risk’ means that if you built something, you will get a fair rate of return on the capital investment, and the variable costs will be passed through. This system worked well, and would still have been in place today, if it hadn’t been for changes in technology.

When comparing differences in competition on the market between the electric utility industry and public transportation, the problem of competition in transport turns to the question of who wants to bid and how do you get bidders. Another problem is that when you shift among different contractors, there is a transition period, this period could be messy and create disruption in service and confusion among customers. A third problem is the question of how do you attract and retain competent people and secure good information in the public regulatory oversight organization. One solution to this has been mentioned in a meeting with M. Pollit11, which is to set McDonalds and the way they handle franchises as an example.

Franchising has existed for a long time. The earliest forms of franchising date back to feudal times when English monarchs gave their nobles the rights to levy and collect taxes in return for the nobles providing armies. In today’s concept of franchising, a franchisor grants to a franchisee the right to sell the franchisor’s product or provide the franchisor’s service using the methods and marketing procedures laid down by the franchisor12. A more precise definition for franchising is “A form of business organization in which a firm which already has a successful product or service (the franchisor) enters into a continuing contractual relationship with other businesses (franchisees) operating under the franchisor’s trade name and usually with the franchisor’s guidance, in exchange for a fee”13.

In the case of McDonald’s, franchising is a predominant way of doing business and franchisees have played a major role in its success. The first franchised McDonald’s Restaurant opened in Illinois in 1955. Currently, approximately 70% of McDonald’s worldwide restaurant businesses are owned and operated by franchisees. The fact that McDonald’s owns 30% of its own restaurants helps them retain important information and expertise on how the business should be run and provides them with an inside view on the actual costs and other financial information. Most financing experts agree that the best source of financing information remains the franchisor. This way, through a franchise set-up, the party that wants to attract bidders is in

11 Meeting with M. Pollitt, a senior lecturer in business economics at Cambridge University, during Spring 2003.
a better position both to regulate intelligence and formulate the requirements and find attractive ways in which to attract potential bidders.

Role of technology

Improvements in generation, transmission, and distribution technologies helped lower the price of electricity and maintain stakeholders and customers happy. There was a well-accepted ideology of growth that helped utility managers maintain dominance. However, many did not foresee the fact that technological improvement along traditional lines would eventually come to a halt. According to Hirsch (1999), “Power company managers strove to maintain control by encouraging development of conservative inventions – technologies that preserved the existing system”. Thus, managers and their allies sought to stifle radical innovations that could upset the current system. However, in the end, the halt to further technological improvements raised prices and doubts about the current system. It is important to understand that not only is the role of technology important, technological improvements are necessary to continue the system.

Quality and quantity of personnel

The quality and quantity of personnel is important to make a system work and have people that know the industry well with a clear vision on what is needed and where it should be going. Some examples of where this went wrong can be found in the fact that as the prestige of the regulatory commissions declined so did the quality of the people who served them. According to Hirsch (1999), this lower quality can be partly explained by the poor compensation. Another factor mentioned by Hirsch (1999) is that managers facing the changes in the industry in the 1970s came from the middle and lower strata of engineering and business schools. These were attracted by the steady, conservative, and risk-averse nature of the industry whereas the brighter and more aggressive students entered electronics and computer industries.

The RTA as a public utility commission

To make the analogy to the Chicago public transportation system, the RTA is in a position similar to a public utility commission, with three service board monopoly providers that it regulates by controlling the flow of funds. It needs strong leadership and competency. It also needs to be able to increase resources to allow the service boards to improve, and it needs
clear performance indicators so that the service boards understand how they are being evaluated and what benefits they can expect if they perform well.

The other lesson from the utility industry is that, where possible, competition should be introduced to help reduce cost. This seems especially applicable to the PACE and CTA bus service where the need exists for the introduction of competition and new technology that should allow improved quality and efficiency. The core function of the regulator is consumer interests in a reasonable price, fair and ubiquitous service based on reasonable standards, as well as fair recognition of the constraints of the producers. If the domain is considered the entire urban transportation system, including the auto and public transportation system, increased charges on the auto would be used to cross-subsidize public transportation and reduce congestion.

Finally, it is important to realize that public transportation is a subset of a larger transportation system that includes, among other things, the automobile and the highway. To be able to study the public transportation system to its full extent, these need to be recognized. This larger system would then need to be included in the system structure, along with appropriate performance indicators. Such a concept might better capture the goals of Chicago Metropolis 2020, which include creation of one regional growth and transportation commission to plan, fund and coordinate growth and transportation in Northeastern Illinois. However, in view of the severe problems facing the Chicago public transportation system, this thesis focuses on the RTA component of what might be a larger system.
4 Available data

4.1 Introduction

A wide range of data is collected for different reasons and by different sources. The goal of this chapter is to find out what data is being or has been collected that can be used as performance indicators. A second reason is to find out what indicators are commonly used in the industry. This is to know what data people are familiar with and what data collection procedures have already been established.

Several approaches are used to find out what data is being collected or available and what performance indicators are used. The first is to look at what data is collected nationally. The second is to look at data and performance indicators that have been collected for the Millennium database, a comprehensive international database that includes a wide range of indicators related to transportation and urban characteristics of metropolitan areas. The third approach is to look in greater detail at data collected at the level of the individual transit agencies and data that is collected within the Chicago public transportation system.

4.2 Data collected nationally

At the national level, data is collected on a wide range of topics. The Bureau of Transportation Statistics includes links to a number of websites where national data is available. The most interesting databases related to transit that can be found on this site are listed in the table below. This list is substantially shortened from the one that can be found on the website. This is due to the fact that a number of links containing interesting data only contain data aggregated at the national level rather than including data that is split up by state or metropolitan area.

<table>
<thead>
<tr>
<th>Database</th>
<th>Type of information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Census Transportation Planning Package (CTPP)</td>
<td>The 1990 Census Transportation Planning Package (CTPP) is a collection of summary tables that have been generated from both the 1990 census short and long forms. The tables contain information on population and household characteristics, worker characteristics and characteristics on Journey-to-Work.</td>
</tr>
<tr>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>Census Transportation Planning Package (CTPP)</td>
<td>The Census Transportation Planning Package (CTPP) is a collection of summary tables that have been generated from the 2000 Census. The summary tables contain three sets of tabulations: Part I – Place of residence, Part II – Place of work, and Part III - flows between home and work.</td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>National Transit Database (NTD)</td>
<td>Annual data on performance, operations, safety, finances, and accessibility of over 500 transit operators in over 400 urbanized areas in United States.</td>
</tr>
<tr>
<td>Federal Transit Administration Grant Assistance Programs</td>
<td>Summary data on funding levels for each transit program by state and urban area.</td>
</tr>
</tbody>
</table>

Of the above, the National Transit Database (NTD) contains perhaps the most useful data that can be used as performance indicators for the Chicago Public Transportation System; the Federal Transit Administration (FTA) collects this data. Each year, almost 600 transit operators report to the FTA on transit activities in more than 400 urbanized areas. This makes the NTD the most comprehensive source of domestic transit data.

The reporting of data by transit agencies is part of a requirement found in Section 15 of the Federal Transit Act. Section 15 of the Federal Transit Act (amended in 49 U.S.C. 1611) requires transit agencies to collect and report financial and operation data to the FTA who is responsible for administering this data. One of the main goals of requiring this information is for use in public transportation planning and public sector investment decisions. Any level of government may use the data in their policy development and decision-making. Fixed guidelines are used to collect the data to encourage and implement a uniform system of accounts.

Data reporting is required if an agency wishes to receive grants from the FTA. Under title 49 of the Transportation Act (§630.1 - §630.12) it can be read “Each applicant for and direct beneficiary of financial assistance under section 9 of the Federal Transit Act must comply with the applicable requirements of the section 15 Uniform System of Accounts and Records (§630.4)”. It also states “Failure to report data in accordance with this part will result in the reporting agency being ineligible to receive any section 9 grants directly or indirectly (§630.5)”. Thus, in order to receive federal assistance, an agency must have collected and reported the required financial and operating data. This means that it is likely that transit agencies have a good reason to collect this data and will make an effort to do so.

What is the availability of historical data from the NTD? The Uniform System of Accounts and Records and Reporting System was first authorized in 1974 by Section 15 of the Urban Mass Transportation Act of 1964. However, Section 15 initially included only one required level of reporting with three increasingly detailed levels of voluntary reporting, with the first annual NTD Report published in May 1981. Changes in data collection make it difficult to compare data from 1981 to the current year. According to the FTA (2004) website, a comprehensive evaluation of the future of Section 15 took place in the late 1980s and early 1990s by the FTA. Based on input from advisory groups a revised reporting system was developed for the 1992-reporting year that included major structural and procedural changes to improve the database and reduce the burden to reporters. A second change in the NTD occurred in the 2001 reporting year, with
input from the National Academy of Sciences. Thus, even though historical data exists, changes over the years may not make it possible to compare data historically.

The data and indicators, that are publicly accessible at the NTD website, can be arranged into categories for service, finance, performance measures, and other. The most interesting data is shown in the table below.

**Table 5: Useful data collected by the National Transit Database.**

<table>
<thead>
<tr>
<th>Service Consumption</th>
<th>Service Supplied</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual passenger miles</td>
<td>Annual vehicle revenue miles</td>
<td>Incidents and patron fatalities</td>
</tr>
<tr>
<td>Annual unlinked trips</td>
<td>Annual vehicle revenue hours</td>
<td>Financial information per mode</td>
</tr>
<tr>
<td>Average weekday unlinked trips</td>
<td>Vehicles available for max. service</td>
<td>Service suppl. &amp; consum. per mode</td>
</tr>
<tr>
<td>Average Saturday unlinked trips</td>
<td>Vehicles operated in max. service</td>
<td>Vehicles operated per mode</td>
</tr>
<tr>
<td>Average Sunday unlinked trips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sources of Operating Funds Expended</td>
<td>Sources of Capital Funds Expended</td>
<td>Summary of Operating Expenses</td>
</tr>
<tr>
<td>Passenger fares</td>
<td>Local funds</td>
<td>Salaries, wages and benefits</td>
</tr>
<tr>
<td>Local funds</td>
<td>State funds</td>
<td>Materials and supplies</td>
</tr>
<tr>
<td>State funds</td>
<td>Federal assistance</td>
<td>Purchased transportation</td>
</tr>
<tr>
<td>Federal assistance</td>
<td></td>
<td>Other operating expenses</td>
</tr>
<tr>
<td>Other funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service efficiency (by mode) –</td>
<td>Operating expense per vehicle revenue</td>
<td></td>
</tr>
<tr>
<td>Cost effectiveness (by mode) –</td>
<td>mile and per vehicle revenue hour</td>
<td></td>
</tr>
<tr>
<td>Service effectiveness (by mode) –</td>
<td>Operating expense per passenger mile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and per unlinked passenger trip</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unlinked passenger trips per vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>revenue mile and per v. rev. hour</td>
<td></td>
</tr>
</tbody>
</table>

In addition to the sources of data collected nationally that were listed in an earlier table, the Texas Transportation Institute (TTI) publishes an Urban Mobility Report every year. This report looks at 75 cities, including Chicago, and provides information on congestion and mobility issues. The Annual Urban Mobility report uses statistics from generally available data sources and provides information about mobility trends at the urban area level of detail. The latest report is titled “2003 Urban Mobility Study” (TTI, 2003).

This report includes mobility data on the following topics:

- **General** - Urban area (square miles), year, population size, population density (persons/square mile)
- **Road travel** - Freeway daily vehicle-miles of travel, freeway lane-miles, principal arterial daily vehicle-miles of travel, principal arterial lane-miles, roadway system daily vehicle-miles of travel, roadway system centerline miles
- **Transit** - Public transportation annual passenger-miles of travel, public transportation annual passenger trips, value of time ($/hour)
- **Cost** - Commercial cost ($/mile), fuel cost ($/gallon), total annual congestion cost ($million), annual congestion cost per person ($)
- **Delay** - Annual person hours of delay, percent of delay that is recurring, percent of delay due to incidents, annual delay per person (person-hrs), annual delay saved by public transportation, annual delay saved by public transportation per person
- **Congestion** - Percent of peak VMT that is congested, percent of freeway and street lane-miles that are congested, number of ‘rush hours’ (when system might have congestion), annual lane-miles needed to maintain constant level of congestion, daily transit or carpool riders needed to maintain congestion level
- **Other** - Annual excess fuel consumed (mil gallons), annual wasted fuel per person (gallons)


### 4.3 Millennium Database

The International Association of Public Transportation (UITP) developed and compiled, in assistance with Murdoch University in Australia, a database containing data on 100 cities in the world, also referred to as the ‘Millennium Cities Database’. The collected data is set up into several categories and contains a wide variety of information on characteristics of cities, the urban environment and their (public) transportation system.

The categories that exist in the Millennium Cities Database are:
- Characteristics of the metropolitan area
- Supply indicators
- Mobility indicators
- Public transport productivity
- Transport financial cost
- Transport externalities indicators
- Public/private transport balance indicators

Each category contains more detailed indicators which can be found in Appendix I. The range of indicators collected by UITP and Murdock University is quite broad and well thought, containing data across a wide range of topics and including a large number of cities. However, the disadvantage is that this data has only been collected for one time period and is not available for a consecutive number of years. In addition, this was a first attempt at such a database,
making future attempts uncertain. There should be sufficient incentive and money to collect this data consistently as well as cooperation from the different cities and agencies to provide such data for a longer time-period for it to be useful. Also, if future attempts do occur, it is possible that lessons learnt from the first database will be incorporated which will make it difficult to compare data across years, at least for the first few years. On the other hand, such a wide range of data, even though it is only available for one year, does provide us with an overview of various indicators that are interesting to look at and consider for the Chicago public transportation system.

UITP and Murdock University not only collected data but also performed analyses and came up several conclusions that enable 'conditions for attractive and efficient public transport' and which would be useful to keep in mind when developing performance indicators for the Chicago Public Transportation System later on. The conclusions include: limiting the car population through taxation on new vehicle purchases, limiting the number of city centre parking spaces, the need for an appropriate speed and regularity in order to encourage motorists to travel by public transport (in this regard, rail modes operating on exclusive rights-of-way are particularly attractive), that low fares have little effect on attracting motorists onto public transport, and that the most efficient public transport networks (those with the lowest passenger x km cost) serve dense conurbations and primarily operate rail modes running on exclusive rights-of-way.

4.4 Data and indicators used by transit agencies

Previous chapters stress the fact that performance indicators should evaluate the effectiveness of structural reform, from more than just an agency perspective. Even though transit agencies originally used performance indicators for evaluation and design standards, when looking at what data is being collected, that what is collected by a transit agency cannot be overlooked. Especially since, as was mentioned in an earlier chapter, transit agencies have a long history of working with performance indicators and collecting data.

When looking at indicators that are commonly used by transit agencies, the data collected internally can be divided into two categories: route (or stop) specific and system wide. According to Wilson (2000b) system wide data includes unlinked passenger trips (required by FTA), passenger-miles (required by FTA), and linked passenger trips. At the route (or stop) specific level, data that is usually collected by individual transit agencies includes load (at peak point),
running time, schedule adherence, total boardings, revenue, boardings (or revenue) by fare category, passenger boarding and alighting by stop, transfer rates between routes, passenger characteristics and attitudes, and passenger travel plans.

Besides the categorizing the data into ‘route-level (or specific)’ and ‘system wide’, a framework with three other categories related to service is often used by transit agencies. These three categories are: service input, service output, and service consumption. The following figure shows the relationship of these three categories to another and provides examples of indicators that are commonly used in each category. Note that each of the categories can be linked to another and lead to indicators for: cost-efficiency, cost-effectiveness, and service-effectiveness.

![Figure 5: Relationship between service input, service output & service consumption.](image)

Other internal data collected by transit agencies is presented in the table below.

<table>
<thead>
<tr>
<th>Table 6: Internal data collected by transit agencies.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Quality</strong></td>
</tr>
<tr>
<td>• Formal procedures focusing on on-time performance; i.e. rush hour on-time performance.</td>
</tr>
<tr>
<td>• Other: passenger complaints, missed trips, accidents.</td>
</tr>
<tr>
<td><strong>Economic Productivity Measures</strong></td>
</tr>
<tr>
<td>• Passengers per vehicle hour (= used by 78% of agencies)</td>
</tr>
<tr>
<td>• Cost per passenger (= used by 63% of agencies)</td>
</tr>
<tr>
<td>• Passengers per vehicle mile (= used by 58% of agencies)</td>
</tr>
<tr>
<td>• Passengers per trip (= used by 53% of agencies)</td>
</tr>
<tr>
<td><strong>Most critical measures in assessing route performance</strong></td>
</tr>
<tr>
<td>• Passengers per vehicle hour</td>
</tr>
<tr>
<td>• Subsidy per passenger</td>
</tr>
</tbody>
</table>

Concerning data collection and performance indicators within individual transit agencies, it should be realized that current data collection programs are not always optimal or carried out in the best way. Lecture slides by Wilson (2002b) read that comparing data collection programs of
different transit agencies, great variation exists in data collection resources (money spent) as well as techniques used to collect data. Besides this, often no statistical approach is used incorporating required accuracy and data variability, there is little trust in data, and there is an inefficient use of the data that is available.

4.5 Chicago Specific

In Chicago, the Regional Transportation Authority (RTA), Chicago Transit Authority (CTA), METRA, and PACE all collect data (more detailed information on the characteristics of these organizations is provided in the chapter on the Chicago Public Transportation System).

A main source of data that is collected is that data which is required to be reported to the FTA, as mentioned in an earlier section. This data can be found in the National Transit Database. In addition to this, the RTA collects additional and more detailed data that is used for their role as financial oversight and regional planning body. Detailed financial data on revenues and expenses of the CTA, METRA and PACE, is publicly accessible on the RTA website in their Financial Annual Reports. In addition, each of the operators (CTA, METRA, and PACE) collects their own data for internal use. A specific piece of information related to Chicago is the fare recovery ratio. This is set by the RTA at 50% and is one of the highest in the nation.

4.6 Conclusion

In this chapter different sources ranging from the National Transit Database to the Millennium Cities Database, are mentioned that contain data that can be used to evaluate the effectiveness of structural reform. Looking back at the different sources and at the same time looking forward towards the goal of developing performance indicators, there are advantages and disadvantages to each source. Considerations include the cost of data collection, the incentive to collect the required data over a longer period of time, historical availability of the data, widespread, and the degree in which the data is familiar to those that collect and/or use it. A summary of these considerations for each source can be found in the table below.

<table>
<thead>
<tr>
<th>Consideration</th>
<th>NTD</th>
<th>TTI</th>
<th>Millennium</th>
<th>Individual agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of collection</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Incentive to collect</td>
<td>strong</td>
<td>medium</td>
<td>low</td>
<td>strong</td>
</tr>
<tr>
<td>Historical availability</td>
<td>strong</td>
<td>medium</td>
<td>no</td>
<td>strong</td>
</tr>
<tr>
<td>Constant definitions</td>
<td>no</td>
<td>no</td>
<td>n/a</td>
<td>No</td>
</tr>
<tr>
<td>Wide-spread</td>
<td>medium</td>
<td>medium</td>
<td>strong</td>
<td>Low</td>
</tr>
<tr>
<td>Familiarity</td>
<td>strong</td>
<td>low</td>
<td>low</td>
<td>medium</td>
</tr>
</tbody>
</table>
Based on the table above, it appears that the data collected for the National Transit Database and the data that is historically collected by transit agencies should be the primary basis for developing performance indicators for the Chicago public transportation system. Not only is this data available for a longer period of time, it is also most familiar to those that collect it and incentives are currently in place that ensure that the data is being collected.

However, it cannot be automatically assumed that this data is all-inclusive and will fulfill all the needs. Especially, since the previous chapter introduced us to the concept of sustainability and the need to think of interactions with other systems if long term success of the public transportation system is desired. If necessary to come up with indicators representing a certain concept required for sustainability that is not available in the NTD or within individual transit agencies, the Texas Institute, the Millennium Cities Database and other sources can be used to provide insight in indicators that might be useful.

The next chapter will introduce the Chicago public transportation system in greater detail, including some history, the structure of the system and the current problems. Based on this information, specifically the cause of the current problems, a set of indicators will be selected that could potentially measure and evaluate the effectiveness of structural reform, taking into account the concept of sustainability and data that currently exists.
5 Chicago Public Transportation System

5.1 Introduction

Previous chapters consider public transportation systems in general. This chapter attempts to introduce a specific system, the Chicago public transportation system. To understand the way this system works as well as the current problems, the following sections will focus on the history of the Chicago Public Transportation System, the current structure, and the present crisis. Based on this, options for implementing structural change within the system will be suggested.

5.2 History of Chicago Public Transportation System

Background on the Chicago Public Transportation System

The Regional Transportation Authority (RTA) coordinates the public transportation system for the Chicago Metropolitan Area, in Northeastern Illinois. The RTA was established in 1974 through a referendum administered to a six county region. The city of Chicago is the largest municipality and is contained within Cook County. The other counties are DuPage, Kane, Lake, McHenry, and Will. See Appendix II for a map of the Chicago Metropolitan Area in the state of Illinois.

The Illinois General Assembly formed the RTA in the 1970s with the purpose to "provide for public transportation services, facilities and funding" covering the Northeastern area of Illinois (Tescon, 1975). However, region-wide transportation in the area goes back to 1858 when the Chicago City Council granted the first street railway, or traction, franchise. Horse-drawn streetcars in Chicago were the first form of public transportation officially recognized by the city. Over time and with the first cable-car line in 1882, cable power took over horsepower. Street railway companies were formed rapidly and by 1900 several independent railway companies existed in Chicago and the surrounding suburbs (Tescon, 1975).

The independent street railway companies caused public discontent due to poor service and lack of coordination. Out of this, the first "traction investigation committee" was formed in 1898. This committee criticized the fragmentation of public transportation in Chicago. However, while
various committees and the public called for unification, governmental, political and constitutional obstacles prevented this from happening. When problems finally became more severe, the General Assembly called for a referendum in Cook County. In 1945 a bill was signed, after approval by the voters of Chicago, granting of a 50-year franchise to the Chicago Transit Authority, giving it exclusive right to operate local and rapid transit in Chicago and the privilege of operating city-owned subways (Tescon, 1975).

![Train](image)


The CTA was set up as an independent governmental agency, not subject to control of the Illinois Commerce Commission. It was in 1952 that the CTA achieved its goal of unification by purchasing the properties of the Chicago Motor Coach Company. Earlier (1947) it had already purchased the Chicago Rapid Transit Company and the Chicago Surface Lines. Thus in 1952, the CTA became owner and operator of all the principal public transportation carriers in the city of Chicago (Tescon, 1975). Note that even though there was now a single main agency that provided public transportation service in the city, different agencies still operated in the suburbs.

In the following years public transportation entered a period of decline. With fewer riders and higher costs the need for public subsidy arose. At the same time investors who had seen attractive rates of return disappear, no longer had incentives to provide funds necessary for capital improvements. In addition to the need for funding, delegates in the 1970 Illinois Constitution were confronted with the need for a single agency to coordinate transportation entities (Tescon, 1975).

Realizing the need to do something about the situation of public transportation in the state, and despite ever present differences in opinion and backgrounds between rural and urban area delegates, an article on public transportation was included in Section 7 of the 1970 Illinois
Constitution. This article helped provide the constitutional foundation required for drafting legislation to help public transportation in Illinois. However, "without any action everything would still stay the same" (Tescon, 1975).

With no action, the situation of public transportation service in Illinois further declined and around 1970 it was in danger of complete financial collapse. At this point people started to realize that fares would have to be raised or subsidies be provided. Under Governor Richard Ogilvie, the first recognition of public transportation at the state level took place when an Executive Order was issued to establish, within the Department of Local Government Affairs, an office of Mass Transportation. In addition Governor Ogilvie urged the General Assembly to pass a $900,000,000 transportation bond issue and called for legislation to set up the Department of Transportation (Tescon, 1975). But, the crisis was not over yet.

In 1973, the situation worsened. The CTA was forced to raise fares or cut services, suburban bus companies were threatening to go out of business, and commuter railroads were operating in the red. At this point, officials recognized the need for a regional transportation agency. The Illinois General Assembly took the initiative in solving the crisis and a series of public meetings was set up. General agreement existed that an agency should cover the six counties of Cook, Lake, McHenry, DuPage, Kane and Will and that the scope of the agency should be all-inclusive (authority over suburban railroads, suburban bus lines and the CTA). Also, the need for public subsidy was clear. With respect to public subsidy, the biggest question was from which sources the subsidy would come. Differences in opinion also existed on the structure, powers and control of the proposed agency. Finally, it was questioned whether or not it was necessary to have a referendum to obtain voter approval to set up a regional transportation agency (Tescon, 1975).

In December 1973, Governor Walker signed the Regional Transportation Act. For this to happen, negotiation and compromise and been necessary to balance the General Assembly. Everyone had to give a little, including the governor, the mayor of Chicago and the legislature. As a result the public transportation carriers were now assured of a definite funding source. In exchange for this, they would lose some of their autonomy to a new agency called the Regional transportation authority (RTA). The voters, with a narrow margin, approved the RTA on March 1974 (Tescon, 1975).
During the formulation of the RTA ACT, an important question faced by decision-makers was who will be in control, "the city or the suburbs"? The answer found in which "the RTA can truly represent regional interests" was to structure the RTA as an "umbrella agency" with the Board of Directors composed in such a way that the different counties were fairly represented\(^{14}\). This setup had the advantage of leaving the CTA intact (Tescon, 1975).

A second question faced was related to money. Funds were necessary to supplement fare-box revenues so that existing levels of service could be maintained as well as allowing room for improvements. To do so, a diversion of funds took place. Funds include revenue from the state sales tax, a certain amount of each motor vehicle registration fee from the city of Chicago, local government in Cook County, and section 5 funds. Two sources of revenue that were left untapped are the RTA taxing powers on the sale of gasoline and on commercial parking privileges (Tescon, 1975).

In 1983 a second financial crisis occurred and the state legislature radically restructured the RTA. The RTA Act was amended to make substantial changes in the RTA's organization, funding and operations. This included placing all operating and fare responsibilities in three 'service boards' of the CTA, Metra and Pace (more information about these agencies is available in a later section) and gave the RTA increased oversight powers concerning budgets. The RTA was also given responsibility to monitor the financial condition of the service boards and for any issues requiring a regional perspective. This includes coordination of transportation planning activities, market development, and ensuring compliance with federal and state guidelines. Also, the Act requires that half of the operating expenses of the entire RTA system are covered by farebox revenue. To guide financial oversight, the Act requires the RTA board of directors to approve an annual budget, a 2-year financial plan, and to annually review and approve a 5-year capital plan (RTA, 2004).

A further change in 1990 reduced the incremental sales tax to ¾% in Cook County. At the same time, the level of state support was increased to compensate the shift from one to ¾ percent of the sales tax, replacing the stake the state has in the success of the RTA. However, a change in the composition of the RTA board to account for this change in financing did not occur.

\(^{14}\) Note that a section of the Act permits the RTA board to make the RTA an operating agency, if wanted.
With,
1858 – First street railway franchise granted by the Chicago City Council (horse-drawn)
1882 – First cable-car
1945 – Fifty year franchise given to the CTA with exclusive right to operate in Chicago
1952 – CTA owner and operator of all principal transportation carriers in city of Chicago
1970 – Section 7 (foundation for drafting transit legislation) incl. in the 1970 Illinois Constitution
1973 – Regional Transportation Act signed by Governor Walker
1980 – METRA established to serve as the RTA’s commuter rail service; operational in 1984
1983 – Radical restructuring of the RTA takes place. Includes set-up of PACE to operate suburban bus
service within suburban Cook County and the five collar counties
1990 – Revision in funding base to lower sales tax in Cook County to 4% and replace it with state funds.

Lessons from the past

The previous overview of the history of the public transportation system in Chicago is important
because it provides an insight in the issues and problems that have occurred in the past. These
issues are useful to understand the current situation and its problems. Also, to help focus on the
issues that should be included in the development of performance indicators and in thinking
about how the developed performance indicators could best be implemented and integrated into
the system.

The main issues illustrated by the brief history of the ‘system’ include:

- Tension between city and suburbs – “ever present differences in opinion and backgrounds
  between rural and urban area delegates” (Tescon, 1975). This also results in a lack of
  regional interest, lack of coordination and fragmentation of public transportation in the
  Chicago area.
- Importance of money and power – It appears that financial and oversight/coordination
  issues have led to a crisis situation in the past.
- Importance of aligning governmental, political and constitutional interests – “In the years to
  follow, while the public and various committees called for unification, governmental, political
  and constitutional obstacles prevented this from happening” (Tescon, 1975).
- Importance of a crisis – When there is a real crisis, people are willing to compromise and look at how things can be changed.

5.3 Current structure of the Chicago Public Transportation System

System size

The Chicago public transportation system is the second largest in the U.S. (RTA, 2004). Measured by unlinked passenger trips the system had more than 571 million rides in 2001. The system covers 3,700 square miles in the six-county region, which according to the 2000 census has a population of nearly 8.1 million. The RTA system has 367 bus routes, 329 route miles of rapid transit service with 140 stations and 1,189 miles of commuter rail service with 241 stations. The combined assets of the RTA system are valued at more than $24 billion and include nearly 1,200 rapid transit cars, 941 commuter railcars, 2,500 buses and locomotives (RTA, 2001). To get a better understanding of the size of the Chicago public transportation system compared to other systems in the United States, see the table below.

Table 8: Transit Agencies ranked by passenger miles, Fiscal Year 2001 (thousands)

<table>
<thead>
<tr>
<th>TRANSIT AGENCY</th>
<th>CITY</th>
<th>MILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Metropolitan Transportation Authority</td>
<td>New York, NY</td>
<td>14,572,113.6</td>
</tr>
<tr>
<td>MTA Long Island Bus</td>
<td>Garden City, NY</td>
<td>159,178.1</td>
</tr>
<tr>
<td>MTA Long Island Railroad</td>
<td>New York, NY</td>
<td>2,126,874.9</td>
</tr>
<tr>
<td>MTA Metro-North Railroad</td>
<td>New York, NY</td>
<td>2,185,774.7</td>
</tr>
<tr>
<td>MTA New York City Transit</td>
<td>New York, NY</td>
<td>10,075,300.8</td>
</tr>
<tr>
<td>MTA Staten Island Railway</td>
<td>New York, NY</td>
<td>24,985.1</td>
</tr>
<tr>
<td>2. Regional Transportation Authority</td>
<td>Chicago, IL</td>
<td>3,959,594.3</td>
</tr>
<tr>
<td>Chicago Transit Authority</td>
<td>Chicago, IL</td>
<td>1,770,773.9</td>
</tr>
<tr>
<td>Northeast Illinois Regional Commuter RR</td>
<td>Chicago, IL</td>
<td>1,577,183.7</td>
</tr>
<tr>
<td>PACE Suburban Bus</td>
<td>Arlington Heights, IL</td>
<td>247,636.7</td>
</tr>
<tr>
<td>3. New Jersey Transit Corporation</td>
<td>Newark, NJ</td>
<td>2,348,838.8</td>
</tr>
<tr>
<td>4. Washington Metropolitan Area Transit Authority</td>
<td>Washington, DC</td>
<td>1,825,314.2</td>
</tr>
<tr>
<td>5. Massachusetts Bay Transportation Authority</td>
<td>Boston, MA</td>
<td>1,818,140.3</td>
</tr>
</tbody>
</table>

Core system components

The RTA system includes: the Chicago Transit Authority (CTA), the commuter rail division (Metra), and the suburban bus division (Pace). The RTA mission is “to ensure financially sound, comprehensive and coordinated public transportation for northeastern Illinois” (RTA, 2004).

Chicago Transit Authority (CTA) - Provides bus and rapid transit service within the City of Chicago and to parts of suburban Cook County. The rail system is primarily radial, terminating at the central business district (Kirschbaum, 2004). The bus system is designed as a grid. The CTA also operates seven heavy rail routes. On an average weekday, the CTA provides over 1.5 million unlinked trips; CTA buses carry approximately 982,000 passengers while CTA rapid transit carries approximately 505,000 weekday riders (RTA, 2001).

METRA Commuter Rail Division (METRA) - Provides commuter rail service between the suburban areas of the six counties and the City of Chicago. The target market segment is suburban residents working in the central business district (CBD); however the METRA system includes non CBD stops within the city’s boundary (Kirschbaum, 2004). On a typical weekday, METRA carries approximately 304,600 riders (RTA, 2001).

PACE Suburban Bus Division (Pace) - Provides fixed-route bus, paratransit and vanpool services in all six counties. PACE covers 3,500 square miles and many of PACE’s bus routes feed the METRA and CTA rail systems. On a typical weekday PACE provides 130,000 unlinked passenger trips. Pace is the 14th largest bus service in North America (RTA, 2001).

Regional Transportation Authority - The “RTA is a unit of local government, body politic, political subdivision and municipal corporation of the State of Illinois” (RTA, 2002). As mentioned in the history section, in 1983 the Illinois General Assembly reorganized the structure and funding of the RTA from an operating entity to a planning, funding and oversight entity. Operating responsibilities were carried over to three operating divisions: the CTA, METRA and PACE. These three entities are defined in the RTA Act as ‘Service Boards’ and have their own independent board. Thus, the CTA, Metra and Pace are each led by their own Board of Directors. This board determines the levels of service, fares and operational policies (RTA, 2002). Since the reorganization of the RTA in 1983, its responsibilities have been renewed. They can be found in the table below.
Table 9: Responsibilities of the RTA since the reorganization in 1983.

<table>
<thead>
<tr>
<th>Financial and budget responsibility</th>
<th>Regional responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Requirement of RTA board of directors to approve an annual budget, a 2-year financial plan, and to annually review and approve a 5-year capital plan</td>
<td>• Coordination of transportation planning activities – planning issues that affect public transit in the six-county region</td>
</tr>
<tr>
<td>• Allocation of receipts to the various service boards</td>
<td>• Coordination of market development</td>
</tr>
<tr>
<td>• Monitor the financial condition of the service boards</td>
<td>• Ensuring compliance with federal and state guidelines</td>
</tr>
<tr>
<td>• Note that the Act requires that 50% of the operating expenses of the entire RTA system are covered by farebox revenue.</td>
<td></td>
</tr>
</tbody>
</table>

Power and Money

The history of the Chicago public transportation system by Tescon (1975) demonstrates that money and power are both very important in the dynamics of the system. Because of this, more information will be provided on both issues.

RTA Board - The RTA has a 13-member board of which twelve members are appointed and the chairman is elected by at least nine of the 12 appointed members. The twelve appointed directors are appointed from within the six-county region: four by the Mayor of the City of Chicago, one is the chairman of the CTA, four by the suburban members of the Cook County Board, two by the Chairman of the County Boards of Kane, Lake, McHenry and Will counties and one by the Chairman of the DuPage County Board (Regional Transportation Authority, 2004).

CTA Board - The Chicago Transit Board consists of seven members. At the moment, 3 members are appointed by the Mayor of Chicago, of which one serves as Chairman. Two members are appointed by the Governor of Illinois, of which one is Vice-Chair. The Mayor's appointees are subject to the approval of the Governor and the Chicago City Council; the Governor's appointees are subject to the approval of the Mayor and the Illinois State Senate. CTA's day-to-day operations are directed by the President; Frank Kruesi (CTA, 2004).

METRA Board – Metra’s Board consists of seven members appointed by the region’s county boards and the Mayor of Chicago (Regional Transportation Authority, 2004).

PACE – The Pace Board consists of twelve directors who are current and former suburban village presidents and majors. Six directors are appointed by the suburban members of the Cook County Board of Commissioners, representing the six suburban regions as defined in the
RTA Act. Five directors are appointed, one each, by DuPage, Kane, Lake, McHenry and Will Counties. The chairman is appointed by a majority of the chairmen of DuPage, Kane, Lake, McHenry, Will and suburban members of the Cook County Board of Commissioners. Board members serve a four-year term (Pace, 2004).

In addition to detailed information on the different boards, another important issue to consider is the finance. Two important questions related to this are:

- Where does the money come from?
- Where does the money go?

According to the RTA (2002), it has five principal sources of revenue, these are:

1. Farebox revenue – note that each service board has its own fare structure and sets its own fares.
2. RTA sales taxes – include retailers’ occupation taxes, service occupation taxes and use taxes.
3. Public Transportation Fund (PTF)
4. State or federal grants (or any other funds) which the RTA is authorized to apply for and receive.
5. Investment income and other miscellaneous revenue.

The two major sources of transit operating funds are the RTA sales tax and the public transportation fund. The amount of resources collected by both was approximately $820 million in 2001 (Kirschbaum, 2004).

**Public Transportation Fund (PTF)** - By statute the State Treasurer is authorized and required to transfer to the PTF an amount equal to 25% of net revenues realized from the RTA sales tax.

**RTA Sales Tax** - The RTA sales tax consists of a 1% sales tax on goods purchased in Cook County and a 0.25% sales tax on goods purchased in the collar counties.

*Where does the money go?*

Since the PTF and the RTA sales tax are major sources of revenue, these will be focused on:

**Public Transportation Fund (PTF)** - The amounts allocable to each of the Service Boards from the PTF are allocated at the discretion of the RTA Board.

**RTA Sales Tax** - The RTA Act provides that the RTA withhold 15% of the tax revenues generated for the RTA’s General Fund, these may be allocated among the service boards at the
discretion of the RTA. A geographically derived formula is used to allocate the remaining 85% to the Service Boards. The formula results in the allocation shown in the table below.

Table 10: Allocation of the RTA sales tax revenue.

<table>
<thead>
<tr>
<th>Collected in:</th>
<th>CTA</th>
<th>PACE</th>
<th>METRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Chicago</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Suburban Cook County</td>
<td>30%</td>
<td>15%</td>
<td>55%</td>
</tr>
<tr>
<td>DuPage, Lake, Will, Kane and McHenry counties</td>
<td>0%</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Source: RTA (2002).

Overall system

The core components of the Chicago public transportation system include the RTA, CTA, Pace and METRA. Besides these organizations, there are others that are either directly or indirectly involved in the Chicago public transportation system. These include: the Chicago Area Transportation Study (CATS), Chicago Metropolis 2020, the Northeastern Illinois Planning Commission (NIPC), the Illinois Toll Highway Authority, the Illinois Department of Transportation (IDOT), the city of Chicago Department of Transportation (CDOT), and parking.

Chicago Area Transportation Study (CATS) – CATS was formed in 1955 to develop the first comprehensive long-range transportation plan for the region. In the 1970s state and local officials designated CATS as the Metropolitan Planning Organization (MPO) for the northeastern Illinois region. Federal law and regulation require that metropolitan area with a population of over 50,000 have a Metropolitan Planning Organization (MPO). The MPO is responsible, in cooperation with the state, for carrying out the urban transportation planning process in the region. Responsibilities of an MPO include preparing a long-range (20 year) transportation plan for the region, the selection of projects for federal funding, and the preparation of a three-year transportation improvement program (TIP). The CATS Policy Committee, designated by the governor of Illinois and northeastern Illinois local officials as the region's MPO, consists of 20 policy-level representatives of local governments and transportation and planning agencies in our region (CATS, 2004).

Northeastern Illinois Planning Commission (NIPC) – The NIPC was created by the Illinois General Assembly in 1957 and “is the official comprehensive planning agency for the six-county Chicago metropolitan area”. The three main responsibilities of the NIPC are to conduct research required for planning for the region, to prepare comprehensive plans and policies to
guide the development of the region, and to advise and assist local governments. NIPC's governing body includes 34 Commissioners, of which 23 are elected officials (NIPC, 2004).

Besides CATS and NIPC, the Illinois State Toll Highway Authority (ISTHA), Chicago Metropolis 2020, the Illinois Department of Transportation (IDOT), and the City of Chicago Department of Transportation (CDOT) are also included in the overall Chicago public transportation system. As mentioned in an earlier chapter, the urban transportation system is linked to issues of land use and the automobile, which are represented by ITHA, IDOT and CDOT. Also, funding for transit comes from IDOT and CDOT. Therefore these are represented in the overview of the system. The ISTHA is included, among other things, because some reports mention that if reorganization occurs, this organization should be included and set at the same level as CATS, the RTA, and NIPC.

An overview of all of the components that make up the Chicago public transportation system are listed in table 11 and represented in figure 8.
<table>
<thead>
<tr>
<th>Institutions</th>
<th>Founded</th>
<th>Legal bindings</th>
<th>Role</th>
<th>Board / Governance</th>
<th>Budget</th>
<th>Funded by</th>
<th>Size (staff)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATS</td>
<td>1955</td>
<td>1962 Federal Highway Act</td>
<td>Transportation planning agency / Metropolitan Planning Organization (MPO)</td>
<td>20 representatives from local governments and regional transportation and planning agencies</td>
<td>Unknown</td>
<td>IDOT</td>
<td>Approx. 23</td>
</tr>
<tr>
<td>NIPC</td>
<td>1957</td>
<td>Created by the Illinois General Assembly</td>
<td>Planning agency for Chicago Metropolitan Area; research &amp; guidance to local governments</td>
<td>34-member board of commissioners appointed by the governor, mayor(s), and others; 23 are elected</td>
<td>1999: $3,532,358 total income, $3,501,618 total expenditures</td>
<td>Federal, state and local government, private sector.</td>
<td>Approx. 55</td>
</tr>
<tr>
<td>RTA</td>
<td>1974, reorganized in 1983</td>
<td>RTA Act; positive referendum in the counties Cook, DuPage, Kane, Lake, McHenry and Will.</td>
<td>Coordinate public transportation, Financial &amp; budget oversight of CTA, Metra, and Pace.</td>
<td>13-member board; appointed by the Mayor and the counties.</td>
<td>2001: $ 929,782,000 revenue</td>
<td>Non-system generated revenues; incl. RTA Sales Tax, State of Illinois, USDOT FTA, investment income</td>
<td>Approx. 83 (excl. board)</td>
</tr>
<tr>
<td>→ CTA</td>
<td>1945</td>
<td>Independent governmental agency, created by state legislation</td>
<td>Provide public transportation</td>
<td>7-member board; members appointed by the Mayor of Chicago and the governor.</td>
<td>2003: $925 million operating budget, $539 million capital budget</td>
<td>Farebox collection, RTA, federal and state government</td>
<td>&gt;11,000</td>
</tr>
<tr>
<td>→ Metra</td>
<td>1980</td>
<td>During the RTA reorganization (1980s), Metra became the name for the commuter rail system</td>
<td>Commuter rail</td>
<td>7-member board; appointed by the region’s county boards and the Mayor of Chicago.</td>
<td>2003: +/- $0.5 million operating budget, +/- $1 million capital budget</td>
<td>RTA, federal and state government</td>
<td>Approx. 2,700</td>
</tr>
<tr>
<td>→ Pace</td>
<td>1983</td>
<td>Created by reform legislation</td>
<td>Suburban bus</td>
<td>12-member board that consists of suburban village presidents and city mayors.</td>
<td>2002: $131.1 million operating budget</td>
<td>RTA, federal and state government</td>
<td>Approx. 1,490</td>
</tr>
<tr>
<td>Illinois Toll Highway Authority</td>
<td>1968</td>
<td>The Tollway Act</td>
<td>Provide safe and efficient toll supported highways</td>
<td>9-member board appointed by the Governor of Illinois.</td>
<td>2003: $396.7 million in revenue</td>
<td>User financed administrative agency of the State of Illinois.</td>
<td></td>
</tr>
<tr>
<td>City of Chicago Department of Transportation (CDOT)</td>
<td>Information not accessible on website.</td>
<td>Information not accessible on website.</td>
<td>No response to inquiries for inform.</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Chicago Metropolis 2020</td>
<td>1999</td>
<td>Created by the Commercial Club of Chicago</td>
<td>Preparing Metropolitan Chicago for the 21st century</td>
<td>Governed by an executive council (45 members); representatives from business, labor, civic and governmental organizations</td>
<td>Unknown</td>
<td>Nonprofit organization</td>
<td>Approx. 23</td>
</tr>
</tbody>
</table>

5.4 Present Crisis in the Chicago Public Transportation System

As mentioned in the introduction, the public transportation system in Chicago is currently experiencing problems and structural reform may be considered in the (near) future. The goal of this section is to identify the core problems. Information from a wide variety of sources is provided to illustrate that there are problems within the current system. The sources are:

1. Report published by Chicago Metropolis 2020
2. Interviews held in the Chicago area during the summer of 2003
4. View of the Chicago Transit Authority
5. Regional Transportation Taskforce

If the sources have solutions to the problems they list, these will be mentioned as well. On the basis of the above sources and reports, a list of the core problems affecting the Chicago public transportation system will be determined.
1. Chicago Metropolis 2020 Plan

Chicago Metropolis 2020 originated as the result of a report by the Commercial Club of Chicago, a membership organization of leading area business and civic leaders. Chicago Metropolis 2020 is governed by an executive council and includes representatives from business, labor, civic, religious and governmental organizations. Half of the representatives on the Executive Council are members of The Commercial Club of Chicago. The mission of Chicago Metropolis 2020 is to ensure that the Chicago region is one of the places in the world where people most want to work and live (Chicago Metropolis 2020, 2004).

In March 2003, the Commercial Club of Chicago published a report titled the Chicago Metropolis 2020 Plan. This report includes a vision for the future along with a call for changes in the region’s land use and transportation policies. One of the goals is to broaden the range of private choices in a way that will lead to a better collective outcome hoping that people will behave differently if offered a better range of choices.

The main problems related to public transportation as described in the plan are:

- Lack of coordination between land use and transportation
- Strong institutional support for local control. This makes it difficult to deal with growth issues that transcend local political boundaries.
- Responsibility for transportation policy is divided among many agencies, none of which have the authority or scope to provide an integrated regional transportation system. For example, the Toll Authority is completely independent, and public transit agencies compete with one another.
- The State has no coherent planning process and no stated goals for growth management.

The first step suggested by the Chicago Metropolis 2020 Plan to address the challenges above is to “Create a Regional Growth and Transportation Commission to plan, fund and coordinate growth and transportation in Northeastern Illinois. This will require state legislation to merge and reorganize the functions of the Chicago Area Transportation Study (CATS), the Northeastern Illinois Planning Commission (NIPC), the Regional Transportation Authority (RTA), the Illinois Toll Highway Authority and other relevant agencies into a single agency with responsibility for regional land use and transportation policy and long-term planning” (Chicago Metropolis 2020, 2003).
The tasks of the Regional Growth and Transportation Commission would include the following:

- Prepare a regional plan to coordinate land use and transportation policies, and regional development issues.
- Serve as the region’s metropolitan planning organization (MPO); become the responsible entity responsible for allocating federal and state transportation funds for Northeastern Illinois.
- Implement an integrated transit fare system and other policies designed to increase ridership.
- Absorb the current functions of the Illinois State Toll Highway Authority.
- Develop a comprehensive 20-year capital and operating plan for transportation that is consistent with regional growth and land use goals.
- Plan and fund freight system improvements.

2. Interviews held in the Chicago area during the summer of 2003

In the summer of 2003 Julie Kirschbaum and myself held interviews with representatives of several organizations that make up the Chicago public transportation system. These organizations included the CTA, Center for Neighborhood Technology, Chicago Metropolis 2020, and the RTA. Out of these interviews several reasons were mentioned, for why change is needed. The main points mentioned include:

- Aligning transportation and land use - There are currently lots of different agencies that have responsibility for a piece of transportation and/or planning. Each of the organizations has a different mission and a different funding source. For example, the RTA and CATS should be working on a 'regional transportation plan' but instead things become fragmented because they want to make everyone happy. Also, there is no comprehensive land use plan. It is very fragmented, across 272 municipalities and 6 counties.
- Need for a regional approach instead of a 'my turf' approach.
- Tension between the RTA and the service boards – Besides tension due to financial reasons and power issues, someone mentioned that the RTA has taken over more tasks than originally created to do, thereby acquiring too much power and becoming too political. Also mentioned were that the RTA has the oversight responsibility, but it doesn’t manage and that the RTA tries to speak for the region, but when it comes to money each agency speaks for itself.
- Funding formula – has resulted in less money to maintain and improve service for the CTA and Pace.
3. Challenges of paying for transit operations in the Chicago metropolitan area

A report prepared by Kirschbaum (2004) titled “Paying for Transit Operations; Challenges and solutions for the Chicago Metropolitan Area” describes the way in which transit operations are paid for in the Chicago metropolitan area. Where the money for transit operations comes from and where this money goes to has already been mentioned in an earlier section. However, Kirschbaum (2004) looks at this in more detail, specifically the RTA sales tax formula. In addition, she lists the advantages and disadvantages of having a geographically based formula for the allocation of the main portion of operation resources.

As mentioned earlier the RTA sales tax formula is a geographically based formula. Advantages of such a formula are that the distribution of funds are more easily understood and perceived as fair by residents (i.e. voters). Also, once established, the formula tends to be relatively free from political manipulation and encourages long term planning because resources are predictable from year to year. The primary disadvantage of a geographically based formula are that it does not relate directly to the service needs of each region (Kirschbaum, 2004).

What does this mean for Chicago? The table with the allocation of revenues, according to the geographically based formula, shows that the collar county resources are distributed exclusively to PACE and METRA. This is because the formula was derived during a time when many suburban residents were frustrated because they felt they were subsidizing urban areas. However, this has created tension over time since most suburban trips include a transfer to the CTA. For example, most METRA trips terminate in the city of Chicago and suburban residents use the CTA when they visit the city. This is supported by a recent CTA study, which found that approximately 19% of all CTA rides carried involve suburban riders.

Analysis performed by Kirschbaum (2004) shows that even though the total sales tax has increased in terms of real dollars since 1992, the CTA’s real funding decreased slightly while METRA’s funding has increased over time. Because of this, the CTA’s portion of the sales tax revenue falls significantly short of its net-operating expenses making the CTA disproportionately dependent on RTA’s discretionary dollars. For more than a decade, the CTA has received the majority of the operating discretionary funds (approx. 95%). The allocation of discretionary funds is important because it represents the RTA’s primary leverage with the service agencies (Kirschbaum, 2004). It also demonstrates that the distribution formula was substantially unrealistic from the beginning and never did reflect real need.
In addition, changing demographics in the area, which have translated into a shrinking tax base within the City of Chicago, have also hurt the CTA. PACE also suffers from inadequate resources, and the high cost recovery ratio. Kirschbaum (2004) concludes that, in Chicago, the geographically based formula has negatively impacted the RTA, the CTA, and PACE. This is also from a macro perspective since the formula hinders the RTA’s ability to promote regional planning and to make metropolitan based decisions.

Besides issues of funding for transit operations in the Chicago metropolitan area, Kirschbaum (2004) also points to some issues related to the structure of the RTA. One of these is that the 1983 Amendment established the three service boards so that the individual agencies could be more responsive to their local constituents with each agency having a separate board of directors that determines the level of service, and sets fares and operating policies. However, as a consequence, the agencies are often in competition with one another for capital and operating resources. Also, the appointments for the RTA 13-member board of directors show that approximately 60% of the board represents the suburbs and 40% represents the urban core (Kirschbaum, 2004). This while Chicago produces most of the transit trips.

4. Chicago Transit Authority
The president of the CTA is concerned with the way things are going, not only with the CTA but in the region as a whole. In particular funding issues and the role of the RTA seem critical, and are indirectly demonstrated during a presentation in March 2004 where one of the slides reads “As the need to provide high-quality alternatives to driving has become more important than ever, RTA plays a critical role in ensuring that CTA, Metra and Pace are adequately funded and attract transit ridership” (Chicago Transit Authority, 2004b).

According to the CTA the main regional challenges are:
- Ridership – National transit ridership is near its highest since 1960 while the region’s ridership is near its lowest. The region has lost about 875,000 transit rides on an average weekday over the past 25 years.
This also means an increase in congestion, wasted resources, and air pollution. See the figure for RTA ridership.

- Funding – The current funding structure has shifted focus from growth of service to prevention of service cuts and fare increases. The structure not only does not provide incentives to increase service or ridership, it does not allow for increases in subsidy even if ridership has declined due to a lack of funding or if funding is necessary to maintain the system at its current state.
- Traffic – The region has become the 3rd most congested in the country according to the Texas Transportation Institute’s 2003 Urban Mobility Report (TTI, 2003).
- Air pollution – The region has become a severe non-attainment area for ozone and particulates.
- Coordination – A lack of fare & schedule coordination are barriers to ridership growth.

Source: (Chicago Transit Authority, 2004b).

Over the past 25 years, the CTA’s ability to fund transit service growth has steadily diminished. Specifically related to the CTA, the problems are (Chicago Transit Authority, 2004b):

- Statutory funding formula – The formula is unrelated to performance which has required, since its inception, over-dependence on annual discretionary distributions.
- Loss of federal funds despite increasingly costly federal mandates such as paratransit.
- A 50% farebox recovery ratio that leads to periodic fare increases and service cuts.
- Funding contributions are unrelated to cost-effectiveness.
- Loss of the collar county 3/4% sales tax as a result of the RTA amendment in 1983. This amounts to about a $300 million loss measured in 2004 dollars.

5. Regional Transportation Taskforce
In August 2003, the Governor approved SB 726. This meant the creation of a Regional Transportation Task Force that will gather information and make recommendations to the Governor and the General Assembly regarding transportation programs in Northeastern Illinois, including the counties of Cook, DuPage, Kane, Lake, McHenry, and Will. The fact that it was necessary to install a task force, demonstrates the need to study the current situation and come up with alternative options to improve the situation.
According to the bill, the recommendations must include, without limitation (Illinois General Assembly Website, 2003):

- Examining the feasibility of merging CATS, NIPC, RTA, and ISTHA into a single agency.
- Identifying areas where functions of these and other agencies are redundant or unnecessary.
- Identifying methods to promote cost effectiveness, efficiency, and equality in meeting area transportation needs.
- Examining regional and economic impact as it relates to potential policy implementation.

The taskforce is chaired by U.S. Rep. William Lipinski and includes the heads of numerous key transportation and planning agencies\(^\text{15}\). Legislative leaders and Governor Rod Blagojevich appointed the members; the taskforce has 22 members in total, of which 11 with voting powers (Chicago Business, 2004). The first meeting of the taskforce was held on January 23, 2004. By law, the task force is required to submit a report to the Governor and the General Assembly concerning its findings and recommendations; this was done in April 2004. Note the relatively short time period to study the situation and present solutions.

The suggestions for reform listed in the taskforce report include:

1. New umbrella transportation agency for planning and land use - Set up of a regional policy board that merges the NIPC and the CATS. The governor would appoint 3 people to the board while Chicago's mayor would have 6 appointments. Other board members would come from county board appointments from Cook and the 5 collar counties.

2. Reconfiguration of RTA
   - New position appointed by governor to oversee/run the RTA - The governor, with the approval of the state senate, would appoint an RTA chairman who will act as a CEO for a four-year term. Note, currently the RTA board appoints the chairman (with 9 of 12 votes needed for approval). The appointee would have major say over the operations at the CTA, Pace and METRA and has already been referred to as the 'new transportation czar'.
   - Change in RTA board - The RTA board will have 7 appointees apiece from city and suburbs. Note, currently this is 5 city appointees and 7 suburban appointees. The Governor will appoint a powerful chairman. Also, most board votes, for example budget

\(^{15}\) Note, members of Chicago civic groups such as Chicago Metropolis 2020 as well as members of the Metropolitan Planning Council have not been named in the taskforce.
decisions, will be allowed with a simple majority (8 votes); the current system requires a supermajority (3/4 of the votes).

3. Merging Pace and METRA and reorganization of new board – The new name suggested is METRA-link, the board would be expanded from 7 to 16 members. The Governor would get 6 appointments for board members; he currently has zero. Note that Lipinski offered an amendment that will eliminate the Governor’s involvement in the board and leave the appointments with the local Council of Mayors.

4. Re-constitution of the CTA board – The CTA board would be expanded from 7-13 members; this means that the Mayor of Chicago will have 1 more appointee than the governor.

5. Create a universal fare card – A universal fare card is the only suggestion that has not caused debate and which everyone seems to agree on.

Main problems

After having listed the opinions and thoughts of different sources it becomes clear that there are indeed problems for which structural change of the Chicago public transportation system could be a solution. Before jumping into possible solutions and performance indicators for each solution, it is important to summarize the problems to understand what the objectives for structural change should be linked to. This is done in the table below.

<table>
<thead>
<tr>
<th>Finance</th>
<th>Governance (Structure, /power politics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Farebox recovery ratio is highest in the country.</td>
<td>• Tension between city and suburbs - CTA claims to provide more service with less money and that the RTA funding contributions are unrelated to cost-effectiveness.</td>
</tr>
<tr>
<td>• Lack of funding to maintain and improve system → Federal Operating Assistance decreased → Paratransit costs increased → Changing demographics result in a shrinking tax base within city of Chicago</td>
<td>• Structure of RTA set up in such a way that the service boards compete instead of focus on coordination and regional thinking. → Each service board has a separate board of directors that determines levels of service and sets fares &amp; operating policies → Appointments of the RTA board show that approx. 60% represents the suburbs and 40% the urban core</td>
</tr>
<tr>
<td>• The geographically based formula used to distribute funds among CTA, METRA and PACE results in unequal distribution of operating funds</td>
<td>• Lack of coordination between land use and transport. - A large number of agencies exist that play a role in land use and/or transportation which makes it difficult to coordinate and develop a regional vision.</td>
</tr>
</tbody>
</table>

It is important to realize that structural change alone will not solve the problems in the current system. The above table shows that finance is an important issue that should be considered. If inadequate finance is not dealt with, this could result in:

• Ridership will continue to decrease
• Political tension will increase
• Fare recover ration will result in a loss of bus service

5.5 **Options for implementing structural change within the system**

This section suggests solutions for structural change that, in different degrees, attempt to solve some or all of the problems of the Chicago public transportation system that were listed in the previous section. From the suggestions for structural reform, provided by the taskforce and the individual stakeholders, three modifications in regional structure will be considered. These are:

- Current RTA structure
- Modest reform
- Major reform

**Option 1: Maintain current structure**

The first option does not include any change in the structure of the Chicago public transportation system. There are several reasons to include this option:

- Not everyone thinks that there is something wrong with the current structure, some would like things to continue the way they currently are. For example, a memo by METRA shows that they are happy with the current structure.
- Others believe that a change in funding is more important than structural reform. To the CTA, funding seems to be of more importance than structural reform, this is supported by a presentation on the problems in the current system that does not include options for structural change. The focus of the problems and solutions is oriented towards how to increase funding for operation and capital investments instead of structural change.

**Option 2: Modest reform**

The 1983 Amendment established the three service boards so that individual agencies could be more responsive to their local constituents. Each agency has a separate board of directors that determines the level of service, and sets fares and operating policies. However, as mentioned by Kirschbaum (2004), a consequence is that the agencies are often in competition with one another for capital and operating resources. The structural change suggested for option 2 tries to solve this.
Interviews held in Chicago during the summer of 2003 came up with the following suggestions:

- Currently, the separate boards are all appointed politically; this produces tension and an extra unnecessary level. A solution is to get rid of all the service boards and go to one policy board with committees. There is a good argument for not coordinating the operating parts, because this may not necessarily help. Thus, create a single board instead of multiple, but still have different operating agencies.

- RTA as a corporate organization, with CTA, METRA, and PACE as divisions. All similar tasks should disappear to achieve economies of scale, centralize the work, and centralize the fare policy. Note that the RTA board should include representatives of PACE, METRA and the CTA or none at all. An interview held in the summer of 2003 mentioned that currently the CTA is the only one that has a chair on the RTA board while Pace and Metra do not. A solution would be either to get rid of the CTA chair on the RTA board or add a chair for PACE and METRA.

- In addition to the interviews, the head of the Regional Transportation Taskforce is a strong proponent for a reorganized RTA. He believes this will increase cooperation between service boards, enable a greater efficiency of operation and provide a strong leader.

Figure 7: Modest reform.
Option 3: Major reform
The structural change for option 3 tries to deal with some major problems related to issues of structure and power. The suggested solution is partly derived from the report by Chicago Metropolis 2020 which suggests that one should “Require state legislation to merge and reorganize the functions of CATS, NIPC, RTA, ISTHA, and other relevant agencies into a single agency with responsibility for regional land use and transportation policy and long-term planning” and partly from suggestions provided by the Regional Transportation Taskforce which include merging CATS and NIPC and merging PACE and METRA. In addition, this solution contains suggestions that came up in some of the interviews that were held in Chicago in the summer of 2003.

The task force proposal for major reform is the following:

- Merge PACE and METRA (as suggested by the Regional Transportation Taskforce in April 2004). The new board would be expanded from 7 to 16 members. Suggested by the taskforce is that the Governor will get 6 appointments for the new board members; this is not included in this solution. In general, some are afraid that merging PACE and METRA is not sustainable due to a big difference in operation, others believe it will work since both mainly provide service in the suburbs.

- Merge NIPC and CATS (as suggested by the Regional Transportation Taskforce in April 2004). This will create a new umbrella transportation agency for planning and land use. The danger is that the proposed entity will eliminate local control and input in the planning process, this is important to consider when getting into further detail of the merger.

Figure 8: Major reform.
One solution for major reform that has not been selected is merging all stakeholders into one large agency. Merging all stakeholders into one large agency has several disadvantages. One is that public transportation, traffic and land use issues are controlled at the local level. An example is the current relationship between the CTA and the city of Chicago which allows the CTA to influence land use to help public transportation. To enable coordination between traffic and land use issues the agencies responsible for these should be in close contact at a local level. A drawback of one big regional entity is that you won't be able to do this anymore. Another disadvantage of one large agency is that it will become too large and bureaucratic, and thereby less easy to adapt to changes or ready to try out new initiatives.

5.6 Identification of barriers to implementing structural change

The previous section mentions three solutions for structural change. An important question related to this is: What is necessary to achieve change? The history of the Chicago public transportation as well as interviews held in Chicago during the summer of 2003 brought up the following points that are necessary to achieve structural change:

- Crisis
- Good leaders
- Political will
- Outsiders

Applied to Chicago it seems that most points seem to be in place already. This chapter has shown that there are problems occurring in the system that are leading to a crisis. The political will is shown through the Regional Transportation Taskforce that was appointed by the governor and representatives and from the different agencies/organizations that have expressed their concern. Outsiders are involved through the Regional Transportation Taskforce, as well as graduate students and faculty from MIT and the University of Illinois that are performing research on this issue. The only point that remains and is unclear is that of ‘good leaders’.

It should be noted that even with the above points in order, change can still be difficult to achieve. An important constraint may be fear of change. Even though people are unhappy with the current situation, they may still be afraid to let go of the current structure and the power related to it, because they believe that instead of getting better it could also get even worse.
6 Identification and implementation of performance indicators

6.1 Identification of performance indicators for Chicago

The goal of this section is to identify performance indicators that can be used to measure whether structural reform, as suggested in the previous chapter, is likely to be effective. Since the main goals of change are the same, only one set of indicators will be identified, which can be used for each of the three solutions of structural reform suggested in an earlier chapter.

What should the indicators represent? Throughout this thesis the concept of triple sustainability has been cited, so performance indicators relating to equity, the environment and the economy should be developed. In addition, governance and finance mechanisms are key. These five categories should be represented in the final set of indicators and their relationship can be conceptualized in the figure below.

![Figure 9: Framework for identifying performance indicators.](image)

Note that the stakeholders in the system such as government, customers, business, operator, and workers are also of importance, and are indirectly considered from the perspective of each of the five angles of the pentagon. Another issue that might need to be pointed out is the difference between the 'economy' and 'finance' concept. The 'economy' concept, in addition to the relationship between employment needs and environmental protection, refers to accessibility in general, accessibility directly for customers, and reduced congestion for trucks and autos. In contrast to this, the 'finance' concept refers to adequate funding of transit agencies to not only maintain the current service and a state of good repair of the system, but also to the funding needs for system expansion and an increase in efficiency.

Finally, it should be noted that of the five angles of the pentagon, three are outcome oriented (environment, equity, and economy) and two are process oriented (governance and finance). As
mentioned in an earlier section, in order to be successful in evaluating the system and guiding it in the long term, the selected indicators should be outcome oriented. However, research in the previous sections, including the history of the Chicago public transportation system and its current problems, has shown that in addition to outcome oriented indicators, process oriented indicators are also required.

The importance of process oriented indicators can be illustrated by observing that while on paper an organizational chart may look fine, it is often difficult to tell based on that chart whether the organization or perhaps even the system works well too. The need for process oriented indicators in the Chicago public transportation system itself is illustrated through the RTA goal of implementing an integrated fare system. Even though this task has been on the RTA agenda for approximately 25 years, there is currently no integrated fare system installed. An integrated fare system is one of the solutions of the current taskforce that everyone agrees on. The question can then be asked why even though this was on the RTA agenda and everyone seems to be in favor, the RTA progress on this issue has not really been checked or brought to implementation.

The importance of outcome oriented indicators lies in their focus on a certain outcome or goal. An example mentioned earlier was the cost to complete concept applied to the interstate highway system. Under President Eisenhower the Federal-Aid Highway Act of 1956 was passed. This act contained a new method of distributing funds among the States that served as a catalyst for the interstate highway development and, ultimately, its completion\(^{16}\). The Interstate funds were apportioned on a cost-to-complete basis; each State would receive a share of the annual Interstate Construction fund authorization in the same proportion as the cost to complete its system bore to the cost of the system in all States\(^{17}\). To achieve full completion in all States, the Congress periodically (every two years) required the Bureau of Public Roads (BPR), and later the Federal Highway Administration (FHWA), to develop a new estimate of the cost to complete the system. Based on the new cost estimates, taxes were increased and the necessary appropriations achieved by the congress, to secure sufficient funds to complete the system.

This “cost to complete” setup allowed for clear goals and a constant process that looks forward towards these goals. The concept of periodic re-assessment, kept people focused on the

\(^{16}\) Source: http://www.fhwa.dot.gov/programadmin/interstate.html.
\(^{17}\) Source: http://www.tfhrc.gov/pubrds/summer96/p96su10.htm.
completion of the system and the money needed to make this happen. Such an approach has been lacking in the transit industry; here there are often no clear (outcome oriented and longer term) goals and no organized periodic re-assessment to feed back into these goals and secure the required resources.

**Problem definition and indicator selection**

The chapter on data availability discussed what data and indicators are available from different sources. Also, the different sources were ranked, determined by considerations of availability, ease of collection and familiarity to people in the field. Indicators from each source related to the current problems and the five angles of the pentagon are shown in the table below.

**Table 13: Available data related to required performance indicators.**

<table>
<thead>
<tr>
<th></th>
<th>1 – NTD</th>
<th>2 – Agency</th>
<th>3 – TTI</th>
<th>4 - MCD</th>
<th>5 – Other sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>-</td>
<td>-</td>
<td>Congestion indicators</td>
<td>-</td>
<td>Total emissions from veh., tot. auto VMT, transit mode share</td>
</tr>
<tr>
<td>Equity</td>
<td>Fares, service effectiveness, public transp. vehicle km of service per capita, public transp. veh. km per urban hectare, employment</td>
<td>Service density, service cut back</td>
<td>-</td>
<td>Length of public transp. lines per 1000 people, public transp. veh. km of serv. per capita, public transp. veh. km per urban hect.</td>
<td>ADA paratransit deficiency, uniform service standards throughout district</td>
</tr>
<tr>
<td>Economy</td>
<td>Passenger miles, unlinked trips, veh. revenue miles, veh. revenue hours, ridership, fares, bus vehicle hours, rail vehicle hours</td>
<td>-</td>
<td>Delay saved by public transp., congestion cost, delay saved by public transp., % of peak VMT congested, % of freeway &amp; street lane-miles congested,road congestion</td>
<td>-</td>
<td>Multiplier effect of transit expenditures, technology efficiency</td>
</tr>
<tr>
<td>Governance</td>
<td>-</td>
<td>On-time performance, service density, # of employees</td>
<td>-</td>
<td>-</td>
<td>Action to improve triple sustainability use of competition to improve cost effectiveness, # of parking spaces in region, ratio city/suburb in RTA board, zoning</td>
</tr>
<tr>
<td>Finance</td>
<td>Local, state and federal funds, cost effectiveness, ratio of funding contribution to cost effectiveness, funding oper. expens., service efficiency, salaries &amp; wages</td>
<td>Farebox recovery ratio, subsidy per passenger</td>
<td>-</td>
<td>-</td>
<td>Action to secure increased funding to achieve service expansion</td>
</tr>
</tbody>
</table>

As mentioned in an earlier section, it is better to have a few indicators that work well and are clear, measurable, and simple, instead of a long list. Thus, it will not be possible to select all indicators from the table above. A set of core performance indicators needs to be identified. This will be done in two steps. The first step will select three indicators for each of the 5 angles of the
pentagon, resulting in a total number of 15 indicators; these will be considered the basic indicators. A second step will then limit this number further down, to a set of 5 core indicators.

The selection of the 15 indicators and further refinement to a set of 5 core indicators is based primarily on the thought that the indicators should be able to indicate failure ahead of time to enable course correction before a crisis. Looking at the current problems within the Chicago public transportation system it is important to ask what could have told us there were problems before consideration of structural reform and the mention of a crisis. Thus, what indicators could have been early warning signs that the Chicago public transportation system was leading towards a crisis? Based on the problems that were described in a previous section, the focus will be on those indicators that can help answer this question. The selected indicators are shown in the table below.

Table 14: Selection of core performance indicators.

<table>
<thead>
<tr>
<th>Pentagon</th>
<th>Indicator –1</th>
<th>Follow up indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Total VMT</td>
<td>Emissions from vehicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transit mode share</td>
</tr>
<tr>
<td>Equity</td>
<td>Service density</td>
<td>Service cutback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ADA paratransit deficiency</td>
</tr>
<tr>
<td>Economy</td>
<td>Ridership</td>
<td>Road congestion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiplier effect of transit expenditures</td>
</tr>
<tr>
<td>Governance</td>
<td>Action to improve triple sustainability</td>
<td>Ratio city/suburb appointments in RTA board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of parking spaces in region – zoning</td>
</tr>
<tr>
<td>Finance</td>
<td>Action to secure timely adequate funding</td>
<td>Action to improve cost effectiveness through use of competition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subsidy per passenger</td>
</tr>
</tbody>
</table>

Ridership and fare should be measured in absolute and relative (compared to national trend) terms.

Having selected the indicators, it is important to ask whether the data representing these indicators is easily available. The table with the data sources shows that the outcome-oriented performance indicators, which are those relating to triple sustainability, are already being collected in the transit industry. This means that the related stakeholders are familiar with them, which will increase ease of implementation. On the other hand, the process-oriented indicators for governance and finance have not explicitly been collected before and may be more difficult to define. However, as was mentioned earlier, it is important to include these as well.

Discussion of the selected five core indicators

Total VMT (Environment) – As mentioned in an earlier section, the region has become the 3rd most congested in the country according to the Texas Transportation Institute’s 2003 Urban Mobility Report (TTI, 2003). Increased vehicle miles traveled (VMT) effects air quality and other
environmentally related issues. It is important to focus on VMT as an indicator for the environment and other related issues. This indicator also introduces a relationship with other systems that interact with the public transportation system, such as the highways.

**Service density (Equity)** – Service density is an important indicator to ensure and measure equity in public transportation systems. A report by the CTA mentions that if the current funding levels are maintained, service cutbacks will take place in the years to follow. As transit is more cost-effective in higher density areas, the incentive to provide less service in lower density areas is great. However, often those areas are especially in need of transit and less service will have severe effects on those living in these areas and those who are reliant on transit for work or other issues.

**Ridership (Economy)** – Ridership is an important indicator and can be represented in several angles of the pentagon. While national transit ridership is near its highest since 1980, the region’s ridership is near its lowest, having lost about 875,000 transit rides on an average weekday over the past 25 years. If attention had been paid to the ridership trend in the Chicago public transportation system, both in absolute and relative terms, this would have indicated problems several years in advance. It is important to realize that although ridership might be a useful measure of the number of people that use the system, it does not encourage expansion of the system into rural areas. Thus, this indicator should be used in relation to the other core indicators.

The ridership indicator should also distinguish between the different modes. The current focus on the fare recovery ration has led to substantial reductions in PACE and CTA bus service, while METRA and CTA rail have expended service. However, rail cannot serve the entire region, and reasonable levels of bus services are essential to provide at least a basic level of accessibility to public transportation throughout the region. Due to a focus on the fare recovery ratio, the reductions in PACE and CTA bus service have gone by unnoticed. An emphasis on the correct performance indicators, including that of ridership by mode, would have recognized this loss in bus ridership and service, and would have also resulted in action to prevent further loss.

**Action to improve triple sustainability (Governance)** – This is a process indicator that looks at actions taken to improve sustainability, through the use of competition, to improve cost
effectiveness. These actions reflect whether the governance is organized well enough to pay attention to the outcome oriented performance indicators listed above and make a course correction if necessary. If the outcome oriented indicators show early warning signs of a problem or crisis, action should be taken to prevent these from happening.

- Action to secure timely adequate funding (Finance) – As mentioned earlier, sufficient funding is required to maintain the level of current service and state of good repair of the system. To allow for increased service and efficiency, an increase in subsidy is required. Insufficient funding will result, among other things, in service cuts and fare increases. To prevent this from happening, action to secure adequate funding should take place in advance of any service cuts or fare increases. When the core or other indicators show that additional funding is required, action should be taken to secure this before the problem increases any further.

6.2 Implementation of performance indicators

Once performance indicators have been identified it is equally important to implement them into the system. This is because identifying performance indicators when they are not used is useless. Literature on implementing performance indicators includes the TCRP Report 88 – A Guidebook for Developing a Transit Performance-Measure System (TCRP, 2003). After having selected the appropriate performance indicators, some points that should be considered (including steps mentioned in the report) are:

- Change over time (of boards, management, etc.)
- Reaction of management to indicators
- How to keep importance of indicators well known/realized over time
- Develop consensus
- Test and implement program
- Monitoring and reporting of the performance indicators
- Integrate results into agency decision making
- Review and update program

Important to include in the implementation of performance indicators is a feedback system that evaluates the quality and usefulness of the indicators over time. For example, it can happen that a certain indicator comes up which is important to include in the selection of performance indicators. In such a case, the performance measurement system should be open to new thoughts as well as have the flexibility to include the tracking of a new performance indicator if
needed. Also very important, is the ability to take action once indicators show that things are going wrong with the system.

Concerning the implementation of performance indicators in the Chicago Public Transportation system, it is difficult at this point to select an institution or organization that should be in charge of collecting and evaluating data on the selected performance indicators. This is because the Regional Transportation Taskforce is currently considering structural reform and it is unclear whether certain organizations will be merged or not. One suggestion that is currently being considered is a merger between NIPC and CATS. If this is accepted, the new organization could be assigned the responsibility of collecting and evaluating the performance indicators. Advantages are that they are more independent than the operators and/or the RTA and are also not as politically assigned. However, this would only work if the new organization has sufficient power and control and is respected by the other organizations within the Chicago Public Transportation System.

Having selected the indicators of the core group, it is important to ask the question of whether the data representing these indicators is easily available. The table with the data sources shows that most of them are available in the transit industry.
7 Summary and discussion

7.1 Summary

The purpose of this thesis is to better understand the need for structural change within public transportation systems and develop clear goals and indicators relating to structural reform. Because physical and socio-economic differences among regions make it difficult to compare systems from different metropolitan areas, structural change should deal with problems experienced in the old structure, and because the public transportation system in Chicago is currently experiencing problems and structural reform may be considered in the (near) future, the choice was made to apply this research to the Chicago public transportation system.

The attempt to identify performance indicators that evaluate the effectiveness of structural reform of the Chicago public transportation system, started with literature research. Literature review revealed that the focus of performance indicators by transit agencies is shifting from design standards to indicators that include the customer and interactions with other systems. A set of main stakeholders was identified that should be considered in the selection of performance indicators; these are the government, customer, operator, employees and business. The need for indicators that reflect long-term changes in system usage or condition brought the concept of triple sustainability into the picture. Different frameworks of sustainability were studied and applied to public transportation systems. Finally, issues were listed that should be considered when narrowing down the pool of potential indicators and refining the selected indicators into something measurable.

Data sources, both national and international, were studied and advantages and disadvantages of each discussed. Considerations included the cost of data collection, the incentive to collect data over a longer period of time, historical availability, and the degree in which the data is well-known. The electric utility sector was introduced with the idea that, because they have a longer history of dealing with regulatory and power issues, they may provide useful lessons of what has worked, and what has failed, that may assist public transportation institutional structure reform. The electric utility system provided insight into regulatory oversight structures and showed, among other things, the importance of quality and quantity of personnel in oversight organizations.
A brief summary of the history of the Chicago public transportation system demonstrated that tension has always existed between the city and the suburbs and illustrated the importance of the way power and money are distributed and organized within the system. The current system was analyzed, along with problems that may lead to structural reform. Based on the problems, three solutions for structural reform were described, ranging from the current structure to major reform.

The issue of sustainability, the stakeholders, and the problems in the current system lead to the formation of a pentagon representing the concepts that should be considered when developing performance indicators. Based on this framework and analysis of the current problems, a set of ten core indicators are identified and recommended to evaluate the effectiveness of structural reform. In addition to the core indicators, a subset of a larger range of indicators may be used. However, it is recommended to focus on a core set of indicators with which momentum analysis can be "nested". While the thesis focuses on Chicago, the approach can be applied to other urban area transportation systems.

7.2 Discussion

Analysis of what’s missing
The current problems in the Chicago public transportation system demonstrate the need for a select set of performance indicators that can evaluate the system at any point in time and recognize the state of the system ahead of time. Unfortunately, this has not been the case so far. For example, RTA ridership data shows that the system has lost approximately 30% of its riders in the last 25 years while ridership in the rest of the nation has grown. This is a serious problem that needs attention and correction. However, different groups studying the Chicago public transportation system have not recognized the importance of this indicator and therefore are blind to this part of the problem.

The current emphasis on the high fare-recovery ratio and bonds of rating agencies do not call attention to the problems affecting the economy, environment and equity elements of sustainability. The use of the statutory fare recovery ratio as the primary mean of adjusting to limits in subsidy availability has led to substantial reductions in PACE and CTA bus service, while METRA and CTA rail have expanded service and incremental ridership. Yet rail can not possible serve the entire district, and reasonable levels of bus services are essential to provide at least a basic level of accessibility to public transportation throughout the region. Lack of
specific performance measures, reporting on bus service levels and ridership has resulted in a loss in bus ridership and service, and has gone by unnoticed.

Another problem that is currently not recognized is the finance issue. The solutions presented by the Regional Transportation Taskforce include structural and power issues. These might decrease tension on the short-term but will not lead to long-term success if the funding problems are not solved. For example, the CTA has calculated that if no change occurs in the current funding situation, they will have to raise fares one year from now, cut back on service two years from now and will need to continue to decrease service for the foreseeable future resulting in dramatic loss of service within 10 years, and the years after. This demonstrates the importance of looking at the right indicators and that of relating the indicators to the real problems. If you start with the wrong indicators and don’t take the core problems into account, a crisis will recur.

Taskforce recommendations
The taskforce recommendations were listed in a previous chapter. The observation that the finance issue is not addressed stems from the framework developed within this research, which allows identification of performance indictors that report problems within the system ahead of time in addition to the ability to track the success or well being of the system over time. Finance is not only important because the current problems in the system are based on financial issues. Finance is also important because adequate funding is necessary for transit systems to achieve and maintain a state of good repair. Failure to do so is a problem in most US transit systems as a response to budget inadequacy. Beyond a stable provision of current service, the ability to secure adequate funding to expand service and increase efficiency is essential.

A second comment on the taskforce suggestions for structural change that becomes clear from this research is that the solutions are limited to the public transportation system; they focus only on a small part of the system. As mentioned earlier on, the public transportation system interacts with other systems and is itself part of a larger transportation system. Failure to recognize the existence of and interaction with other systems, especially the highway system, demonstrates the inability to see beyond the transit system itself, which is necessary for triple sustainability and thereby long-term success of structural reform.
A positive recommendation of the taskforce seems to be the focus on strong leadership. Currently the RTA chooses the RTA chairman. However, if the new position, also referred to as 'transportation czar' is created, this will allow for strong leadership of someone who shall be less likely to follow the opinions of the organization it governs. In addition, reporting to the Governor will increase accountability. This recommendation increases the stake of the state in the Chicago public transportation system and can be seen as a follow-up of the change that occurred in 1990, when the sales tax in Cook County was reduced from one to ¾ percent, at the same time increasing the level of state support to compensate this shift. A change in the composition of the RTA board to account for this change in financing, and increased stake of the state in the success of the RTA, did not occur at that time.

It also should be noted that, in this new scenario with the RTA chairman reporting to the Governor, it is important that the new leader has sufficient knowledge of and interest in the system, and also a well-developed vision of where it should be heading. The importance of a good leader with a vision comes, among other things, from the history of the electric utility system in an earlier chapter, which demonstrated the importance of strong leadership and competency. A disadvantage of the taskforce focus on a strong leader who reports to the Governor is that political leadership changes. The danger in this lies in the fact that if several years have been spent on building up a well working urban transportation system, it takes little effort to ruin or destroy what has been built if a change in political leadership pushes toward less useful changes. This could be overcome by continuing to require a ‘super majority’ of the RTA to agree with any major decisions.

RTA responsibilities and implementation of performance indicators
An earlier section mentioned that once performance indicators have been identified it is equally important to implement them into the system. Identifying performance indicators but not using them to guide decision-making is useless and a waste of time. This same section identified general issues that should be considered during the implementation of performance indicators and mentioned the difficulty of identifying recommendations for the Chicago public transportation system since it is unclear at the moment whether certain organizations will be merged or not.

Despite the above, it is still useful to discuss an implementation process that the RTA might consider. Based on the current problems, a first recommendation for the current or renewed
RTA is to re-write the distribution formula that, as history has shown, never really worked. This formula should be changed in such a way that each of the service boards receives the funding required to provide adequate service, without having to rely on the RTA discretionary funds and thereby on the RTA. Over time, this change will enable the system to get out of a main cause of the current crisis.

A second recommendation for the RTA should be to secure additional funding that enables the service boards to improve the system and increase service and efficiency. This additional funding, along with the current discretionary funding, should be distributed according to the performance indicators established within this research and thereby in a less arbitrary way than is done at the moment. The set of core indicators should be identified based on the concept of the 5-angle pentagon, with in the background the consensus of the different stakeholders that are involved in the system.

The data for the performance indicators should be collected consistently, on a regular basis, and made available to all stakeholders. These stakeholders are indirectly reflected through the indicators and have the right to track the data over time themselves. It is important that the data is available to all who are interested, hereby increasing their function as early warning-signs and allowing problems to be identified and discussed on time.

*Future research*

There are several areas of future research that can be indicated. A first one is the need for consistent and well-defined data. The chapter on data sources indicated several considerations that should be taken into account when comparing data. One of the issues that emerged is the difficulty of obtaining data related to sustainability, safety/cleanliness of service stations, and governance issues. These concepts are often difficult to define and therefore data on them has not been regularly and consistently collected. The Texas Transportation Institute (TTI) is a good example of a data source that should be looked for. The TTI has been collecting data for a number of years on a core set of topics, including congestion. By doing so and by collecting consistent data they have now achieved a level of expertise and their data is valued and considered reliable by others.

In addition to data needs, the consideration of implementation needs to be expanded. Perhaps a framework or a number of steps should be identified that can be applied to transit systems in
general. However, this area of research might be difficult since implementation of performance indicators depends on and is related to the new structure, which is not always known in advance. Also, political compromise required to achieve legislative approval often submerges issues that are difficult to resolve. An alternate approach would be to maintain the visibility of the most important issues through clear performance indicators and require these to be subject to periodic review.

A second thought concerning implementation stems from research performed on the electric utility industry. This showed the importance of and need for competent staff with adequate skills. If structural change occurs within the Chicago public transportation system and an RTA chairman is appointed by the Governor who will act as CEO for a four-year term, if organizations are merged, or even within current organizations, it is important that competent staff is hired and a way is found in which they can be retained.

Another topic of further research is linked to the realization that public transportation is a subset of a larger transportation system that includes, among other things, the automobile and the highway. To be able to study the public transportation system to its full extent, these need to be recognized. Even though this larger system would need to be included in the system structure, along with appropriate performance indicators, due to the severe problems facing the Chicago public transportation system, this thesis focused on the RTA component of what might be a larger system. Further research would focus on how to reflect this larger system in the public transportation system structure and performance indicators.

Finally, application of this research and the information to other systems might be useful. This last issue will be further expanded on in the next section.

*Applying the information to other systems – the case of Puerto Rico*

As mentioned earlier, while the case study is the Chicago public transportation system because it fits well with the requirements for this research, the basic thoughts and frameworks can be applied to other transportation systems as well. An example of such a system is the public transportation system in the San Juan metropolitan area in Puerto Rico.

The city of San Juan in Puerto Rico has a multi agency institutional framework and is in the process of expanding their transportation capacity with operation of a new rail system. The new
rail system is part of the Tren Urbano (TU) project and entails the design, construction, operation, and maintenance of a 17.2 km heavy rail line including 16 stations; the first modern electric rail system in Puerto Rico.

With the opening of Tren Urbano, there is the need to provide an integrated public transportation service to the user. Users should be able to transfer in a seamless way between the train, buses, publico’s, and other forms of transportation. For this, the Puerto Rico Highway Transportation Authority (PRHTA) has developed a concept called ATI (Alternativa de Transporte Integrado), an authority to integrate the different forms of transportation, to improve integration.

With the commitment to provide an integrated public transportation service to the user, now and with network expansion, the current institutional arrangement will need to be updated and structural reform will need to occur to provide a more effective and efficient service. Adequate organizational and institutional capacity has to be developed in order to integrate and operate Tren Urbano in the expected way, with good longer-term operation and management. Also, feeder service should be in place and working properly, for this plays an important role in the success of the Tren Urbano project.

The above demonstrates the need for structural reform. If this is the case, the basic thoughts and concepts discussed throughout this research can be applied to the public transportation system in the metropolitan area of San Juan to develop performance indicators that will evaluate the effectiveness of structural change and to guide what is likely to be a long incremental process. Also, before and during the process of structural reform, the concepts developed will allow those involved in suggesting solutions for structural reform to focus on issues that are of importance, but the key building block will be to attract and maintain an adequate competent staff. The challenge involved in bringing the new system into operation will require major energy and it is likely that bus and publico services may take time to reach full integration. Progress is often incremental, and the general public may have to experience the benefits of the new Tren Urbano service to develop the political will to undertake broader reform to produce an integrated system.
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WEBSITES


Appendix I: Data categories available in the Millennium Database

This Appendix lists the indicators that are used within each category of the Millennium Database. Note that this list is not comprehensive in that the original list includes an even larger supply of indicators.

Supply indicators

- Private Transport Infrastructure Indicators - length of road and length of freeway per 1000 people and per hectare, parking space per 1000 CBD jobs. Note: length of road or freeway does not say anything about performance or coordination of transit system.
- Public Transport Infrastructure Indicators – Total length of public transport lines per 1000 people, total length of reserved public transport lines per 1000 people, total length of reserved public transport routes per urban hectare.
- Intermodal Transport Infrastructure Indicators – number of park and ride facilities.
- Private Transport Supply (cars and motorcycles) – passenger cars and motor cycles per 1000 people.
- Private Collective Transport Supply (taxis and shared taxis) – taxis per million people.
- Traffic Intensity Indicators – focuses on private passenger vehicles and cars.
- Public Transport Supply and Service – total public transport vehicles per million people, total public transport vehicle kilometers of service per capita, total public transport vehicle kilometers per urban hectare, total public transport seat kilometers of service per capita, overall average speed of public transport. Each is also split up into tram, light rail, bus, etc.

Mobility indicators

- Overall mobility – daily public transport trips per capita, daily private transport trips per capita, total daily trips per capita, percentage of motorized public modes over all trips, percentage of motorized public modes over mechanized trips, overall average trip distance by public transport, overall average trip distance, overall average trip distance by private transport, average time of a car trip, average time of a public transport trip.
- Private mobility indicators (cars and motorcycles)
- Private mobility indicators (taxis and shared taxis)
- Public transport mobility indicators – total public transport boardings per capita, total public transport passenger kilometers per capita. Each one is also split up per bus, minibus, light rail, metro, etc.
- User cost of transport – average user cost of a car trip, average user cost of a public transport trip, user cost of private transport per passenger kilometer, user cost of public transport per passenger kilometer. Also information on charges and fines for parking.

Public transport productivity

- Overall public transport vehicle occupancy - Note, available per tram, light rail, heavy rail, metro, etc.
- Overall public transport seat occupancy - Note, total as well as split up per tram, light rail, heavy rail, metro.
- Public transport operating cost recovery
- Average public transport farebox revenue per boarding
- Average public transport farebox revenue per passenger kilometer
- Average public transport farebox revenue per vehicle kilometer

Transport financial cost

- Public transport cost - % of metropolitan GDP spent on public transport investment, % of metropolitan GDP spent on public transport operating costs, public transport operating cost (per vehicle km, per passenger km, per capita).
- Private transport cost – Similar to above, but for private transport.
- Overall transport cost – Overall transport cost per passenger km (for both public and private), total
passenger transport cost per capita (for both public and private), total passenger transport cost as % of metropolitan GDP (for both public and private).

Transport externalities indicators

- Transport energy indicators – private passenger transport energy cost per capita, public transport energy cost per capita, total transport energy cost per capita, energy use per private passenger vehicle km, energy use per public transport vehicle km, energy use per private passenger km, energy use per public transport passenger km.

- Air pollution indicators – total emissions per capita (split up for CO, SO₂, VHC, NOₓ), total emissions per urban hectare, total emissions per total hectare.

- Transport fatalities indicators – total transport deaths per million people, total transport deaths per billion vehicle km, total transport deaths per billion passenger km.

Public private balance indicators

- Based on calculations with data from the previous categories.
Appendix II: Chicago Metropolitan Area

State of Illinois