

Meeting Environmental Program Goals at U. S. Public Transit
Agencies: A Study of APTA Sustainability Commitment

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Abstract

Transit agencies have a favorable impact on a region's overall sustainability and air quality because they reduce use of personal automobiles. However, public transit vehicles have a considerable impact on air quality too. The American Association of Public Transit (APTA) has established a sustainability program to address this issue. This study uses survey research to determine whether organizational, industry, and financial barriers for signatories of the APTA Sustainability Commitment are impacting their organization's ability to meet their environmental program goals. Overall, this study finds that the barriers identified in the conceptual framework of barriers were not insurmountable at these organizations.

Although in all barrier categories an overwhelming majority of respondents did not agree that barriers were affecting their programs, there was a high level of neutral responses to many questions, indicating that further research may be warranted to find out what can be done to further reduce the barriers to meeting environmental program goals in the industry.

The results of the survey indicated that there were fewer barriers present than expected after conducting the literature review. Since the survey population only included organizations that are signatories of the APTA Sustainability Commitment, this may be an indication that the support provided by APTA for the signatories is having a positive effect on these organizations meeting their environmental program goals. More research is needed on a random sample of all U.S. public transit agencies to determine whether these results are applicable outside of those organizations supported by the APTA sustainability program.

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Chapter 1 - Introduction

The impact of global climate change is on governmental and public agendas today. Organized environmental interests and the public are putting more pressure on public agencies to be good stewards of environmental resources and to contribute to a healthier and cleaner planet.

Public transit systems have an impact on regional air quality. By design, mass transit systems reduce carbon emissions by reducing reliance on personal automobiles. Since “[a]ir pollution is a major issue in the U.S. and vehicle emissions account for a large amount of the carbon monoxide (CO), lead, nitrogen oxides (NO_x), ground-level ozone (smog), sulfur oxides (SO₂), and particulate matter in the air” (Rahm and Cogburn 2006, 9) this is a very relevant topic today.

The American Public Transportation Association (APTA) provides statistics on how public transportation reduces personal and societal carbon footprints. Communities investing in public transit reduce the nation’s carbon emissions by 37 million metric tons annually. While this might just seem like a number, the magnitude is staggering and is equivalent to if New York City; Washington, DC; Atlanta; Denver; and Los Angeles *combined*, stopped using electricity (APTA 2012).

Individually, one person switching to public transit can reduce daily carbon emissions by 20 pounds, which is more than 4,800 pounds in a year. By switching from commuting to work in a single-occupancy vehicle to commuting by public transportation, a single commuter can reduce a household’s carbon emissions by 10 percent, or up to 30 percent if he or she eliminates a second car from the household. When compared to other household actions that limit CO₂, taking

public transportation can be 10 times greater in reducing this harmful greenhouse gas (APTA 2012).

However, transit systems also produce emissions. While the political pressure is growing, a limited amount of public transportation funds are allocated to environmental programs and to personnel tasked to achieve environmental goals. As a result, even when environmental goals are set, meeting them is a challenge for these organizations. The purpose of this research is to describe the barriers to meeting environmental program goals at public transit agencies in the United States. The next section discusses the background of the U.S. environmental movement to illustrate how these topics came to the forefront of today's governmental and public agendas.

Background of U.S. Environmental Movement

The early conservation movement began in the Progressive Era (1890s to 1920s) and focused on the need to protect natural resources for use by humans. Natural resources included in the early conservation movement were fish and game, water, soil and forests. As industrialization swept across the nation in the early 20th century, these natural resources were being over-exploited and depleted.

Conservationists, who were primarily wealthy and powerful men, put forth a developmental strategy based on efficiency, scientific management, centralized control, and organized economic development. This strategy utilized tenets of management systems, which were created to emphasize the balance between immediate needs and long-term production necessary to sustain a continuous yield (Silveira 2004, 499). Today, the conservation movement

includes the sustainable yield of natural resources, preservation of wilderness areas and concerns about biodiversity (Botkin, 2001).

The modern environmental movement began gaining ground in the 1960s and is broader in scope than the conservation movement. At its inception, it primarily considered concerns about air and water pollution but has eventually come to include all natural landscapes and all human activities. The modern environmental movement was spurred by several major events that occurred in the 1950s, 1960s and 1970s. Three prominent examples are the Lucky Dragon Incident, Rachel Carson's book *Silent Spring*, and the Santa Barbara oil spill.

The Lucky Dragon Incident occurred in 1954 when the 23 man crew of the Japanese fishing vessel, Lucky Dragon, was exposed to radioactive fallout from a hydrogen bomb test at Bikini Atoll conducted by the U.S. Government (Woodwell 1967). The bomb was 1,300 times the destructive force of the bomb dropped on Hiroshima (American University 2012) and the Lucky Dragon was caught in the path of the test. The vessel was about 100 miles east of the test site when the bomb detonated, but the crewmembers suffered from radiation sickness immediately, and one of them died of liver and blood damage a few months later. The condition of the crewmembers and the circumstances of their injuries became matters of worldwide interest and intense concern in Japan for months to come (American University 2012, Woodwell 1967). The severity of this incident shows how seemingly unimportant and unconnected environmental events can add up to very significant impacts.

Silent Spring, by Rachel Carson (Carson 1962), is credited with bringing the environmental movement into national prominence. *Silent Spring* inspired widespread public attention to pesticides, namely DDT, and pollution of the environment resulting from their use. As a result, President Kennedy instructed his science advisers to report on the use of pesticides

and appointed an activist secretary of the interior to energetically promote the cause of environmental protection (Rome 2003, 532). The book led to the banning of DDT in 1972 in the U.S., showing that the power of popular interest can have a significant legislative impact.

In 1969, a catastrophic oil spill occurred in the Santa Barbara Channel, off the coast of Southern California. Within a ten-day period, an estimated 80,000 to 100,000 barrels of crude oil spilled into the channel and onto Southern California beaches, causing destruction along the 40 miles of coastline from Goleta to Ventura as well as the shores of the four northern Channel Islands. The spill killed thousands of sea birds, as well as marine animals such as dolphins, elephant seals, and sea lions. The spill received prominent media coverage in the U.S. and focused debate upon coastal oil pollution as a potential crisis in need of fixing (Kurtz 2004, 207). It resulted in numerous pieces of environmental legislation within the next several years (Clark and Hemphill 2002, 157-162) and the resulting legislation formed the legal and regulatory framework for the modern environmental movement in the U.S. (Kurtz 2004, 207).

These events advanced the modern environmental movement. As a result, on March 21, 1970, the first Earth Day was celebrated in San Francisco, California. Earth Day was the culmination of the environmental movement and it was designed to change the direction of society (Rome 2003, 550). The modern environmental movement is considered a social movement because it draws its influence from popular support and borrowed tactics from both the successful Civil Rights Movement and the protests against the Vietnam War (EPA 2012, Rome 2003, 547).

The Case for Environmental Change

The idea of 'sustainable development' was first widely articulated in 1987 in the Brundtland Report from the World Commission on Environment and Development from the

United Nations. At that time, sustainability was framed as “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Johnston et al, 2007, 60). This definition posits that the only truly sustainable form of progress simultaneously addresses the interlinked aspects of economy, environment and social well being (Johnston et al, 2007, 60). More than twenty years later, however, not only is that definition applicable, but it is estimated there are some three hundred definitions of ‘sustainability’ and ‘sustainable development’ which exist within the domain of environmental management and the associated disciplines which link with it, either directly or indirectly (Johnston et al, 2007, 60).

A timeless challenge for organizations has been adapting to changing goals and demands (Piderit 2000, 783), but conceptualizing and communicating organizational purpose in terms of sustainable economic performance, coupled with environmental performance is a major shift in thinking (Post and Altman 1994, 64). Pollution and environmental degradation were once seen as by-products of industrial progress and economic development; they are now seen as societal and global problems that require immediate attention and timely solutions. Even as this awareness has emerged on a global scale, organizations are faced with the enormous practical and conceptual challenges of transforming into economically and environmentally sustainable enterprises (Post and Altman 1994, 64) such as quantifying and communicating the need for environmental changes and finding the resources to implement them. Business organizations of every size and shape are wrestling with the pressures of environmental performance.

For the purpose of this paper, sustainability should be thought of in its most basic form, which is one that attempts to balance economic, social and environmental needs (APTA 2011). This is often thought of as the three-legged stool approach, as seen in Figure 1.1, where the three

legs of the stool are economic, environmental and social concerns. Without any of the legs, the stool would not support the most important element, which, in this case, is sustainability.



U.S. Public Transit Systems

Public transportation is a large component of the transportation infrastructure in the U.S. In 2009, American passengers rode transit vehicles for 55.2 billion miles and \$55.2 billion was spent providing passenger transit services and making capital investment for public transportation (2011 APTA Public Transportation Fact Book, 7). Transit ridership is on the rise in the U.S. In 2011, Americans took more than 10.4 billion trips on public transportation; a 2.3 percent increase over the 2010 ridership, marking the sixth year in a row that more than 10 billion trips were taken on public transportation systems nationwide (APTA, 2012). During the same time, vehicle miles of travel (VMTs) declined by 1.2 percent (APTA, 2012), demonstrating that transit use as a mode choice is gaining ground, even as compared to other types of

transportation. Furthermore, from 1995 through 2010, public transportation ridership increased by 31 percent; a growth rate higher than the 17 percent increase in U.S. population and higher than the 24 percent growth in the use of the nation’s highways over the same period (APTA, 2012). As such, transit agencies have a significant impact on the environment and can have a very large environmental footprint that must be managed.

The U.S. public transit system is fragmented and complicated to comprehend for the average citizen. For example, the following two tables illustrate some of the complexities of public transportation service in the U.S. As Table 1.1 illustrates, in 2009, there were 7,960 public transportation service providers and they vary in size greatly. Included are paratransit service providers with a single vehicle to large multi-modal systems. Table 1.1 shows the different transit modes, including the Público system in Puerto Rico, and the number of systems with each of those modes (2011 APTA Public Transportation Fact Book, 7-33).

Table 1.1: Number of Public Transportation Service Systems by Mode	
Mode	Number of Systems (a)
Paratransit (b)	6,700
Bus	1,088
Vanpool	77
Light Rail	35
Ferryboat	32
Commuter Rail	27
Heavy Rail	15
Automated Guideway Transit	7
Trolleybus	5
Inclined Plane	4
Aerial Tramway	2
Monorail	2
Cable Car	1
Público	1
Total (b,c) 7,200	
Source: 2011 APTA Public Transportation Fact Book, 7, 33	
(a) As of December 31, 2009.	
(b) Includes 5,300 providers of service for elderly and persons with disabilities.	
(c) Total is not sum of all modes since many providers operate more than one mode.	
*Subways are included in Light Rail and Commuter Rail categories	

To further demonstrate the magnitude of the U.S. public transit system, Table 1.2 shows the 50 largest transit agencies in the U.S., ranked by unlinked passenger trips (2011 APTA Public Transportation Fact Book, 8-10). MTA in New York City is the largest of these systems and is staggering in size and scope. MTA carried passengers on 3.2 billion trips for 11.9 billion miles and they top the rankings in three mode categories. Of all U.S. systems, they carry the most bus passengers, paratransit passengers and heavy rail passengers (2011 APTA Public Transportation Fact Book, 8-31).

Table 1.2: 50 Largest Transit Providers in the U.S., Ranked by Unlinked Passenger Mile - 2009				
Rank	Transit Provider	Acronym	Urbanized Area	Website
1	MTA New York City Transit	NYCT	New York, NY	http://www.mta.info/nyct/
2	Chicago Transit Authority	CTA	Chicago, IL	http://www.transitchicago.com/
3	Los Angeles County Metropolitan Transportation Authority	LA Metro	Los Angeles, CA	http://www.metro.net/
4	Washington Metropolitan Transportation Authority	Metro	Washington, DC	http://www.wmata.com/
5	Massachusetts Bay Transportation Authority	MBTA	Boston, MA	http://www.mbta.com/
6	Southeastern Pennsylvania Transportation Authority	SEPTA	Philadelphia, PA	http://www.septa.org/
7	New Jersey Transit Corporation	NJ Transit	New York, NY	http://www.njtransit.com/
8	San Francisco Municipal Railway	MUNI	San Francisco, CA	http://www.sfmta.com
9	Metropolitan Atlanta Rapid Transit Authority	MARTA	Atlanta, GA	http://www.itsmarta.com/
10	Maryland Transit Administration	MTA	Baltimore, MD	http://mta.maryland.gov/
11	MTA Bus Company	MTA BUS	New York, NY	http://www.mta.info/
12	King County DOT	King County Metro	Seattle, WA	http://metro.kingcounty.gov/
13	San Francisco Bay Area Rapid Transit District	BART	San Francisco, CA	http://www.bart.gov/

Table 1.2: 50 Largest Transit Providers in the U.S., Ranked by Unlinked Passenger Mile - 2009

Rank	Transit Provider	Acronym	Urbanized Area	Website
14	Tri-County Metropolitan Transportation District of Oregon	TriMet	Portland, OR	http://trimet.org/
15	Miami-Dade Transit	MDT	Miami, FL	http://www.miamidade.gov/transit/
16	Denver Regional Transportation District	RTD	Denver, CO	http://www.rtd-denver.com/
17	MTA Long Island Rail Road	MTA LIRR	New York, NY	http://www.mta.info/lirr/
18	Metropolitan Transit Authority of Harris County	Metro	Houston, TX	http://www.ridemetro.org/
19	San Diego Metropolitan Transit System	MTS	San Diego, CA	http://www.ridemetro.org/
20	Port Authority Trans-Hudson Corporation	PATH	New York, NY	http://www.panynj.gov/path/
21	MTA Metro-North Commuter Railroad	MTA-MNCR	New York, NY	http://www.mta.info/mnr/
22	City and County of Honolulu DOT Services		Honolulu, HI	http://www1.honolulu.gov/dts/
23	Metro Transit	Metro Transit	Minneapolis, MN	http://metrotransit.org/
24	Northeast Illinois Regional Commuter Railroad	Metra	Chicago, IL	http://metrarail.com/metra/
25	Port Authority of Allegheny County	Port Authority	Pittsburgh, PA	http://www.portauthority.org/
26	Regional Transportation Commission of Southern Nevada	RTC	Las Vegas, NV	http://www.rtcsonthernnevada.com/
27	Orange County Transportation Authority	OCTA	Los Angeles, CA	http://www.octa.net/
28	Dallas Area Rapid Transit District	DART	Dallas, TX	http://www.dart.org/
29	Alameda-Contra Costa Transit District	AC Transit	San Francisco, CA	http://www.actransit.org/
30	Bi-State Development Agency	Metro	St. Louis, MO	http://www.metrostlouis.org/
31	City of Phoenix Public Transit Department	Valley Metro	Phoenix, AZ	http://www.valleymetro.org/
32	Milwaukee County Transit System	MCTS	Milwaukee, WI	http://www.ridemcts.com/
33	Santa Clara Valley Transportation Authority	VTA	San Jose, CA	http://www.vta.org/

Table 1.2: 50 Largest Transit Providers in the U.S., Ranked by Unlinked Passenger Mile - 2009

Rank	Transit Provider	Acronym	Urbanized Area	Website
34	The Greater Cleveland Regional Transportation Authority	RTA	Cleveland, OH	http://www.riderta.com/
35	VIA Metropolitan Transportation	VIA	San Antonio, TX	http://www.viainfo.net/
36	Department of Transportation and Public Works	DTPW	San Juan, PR	http://www.dtop.gov.pr/
37	Capital Metropolitan Transportation Authority	CMTA	Austin, TX	http://www.capmetro.org/
38	City of Detroit Department of Transportation	DDOT	Detroit, MI	http://www.detroitmi.gov/
39	Broward County Transportation Department	BCT	Miami, FL	http://www.broward.org/
40	Utah Transit Authority	UTA	Salt Lake City, UT	http://www.rideuta.com/
41	Sacramento Regional Transit District	RT	Sacramento, CA	http://www.sacrt.com/
42	Pace - Suburban Bus Division	PACE	Chicago, IL	http://www.pacebus.com/
43	Westchester County Bee-Line System		New York, NY	http://transportation.westchestergov.com/
44	City of Los Angeles Department of Transportation	LADOT	Los Angeles, CA	http://www.ladottransit.com/
45	Metropolitan Suburban Bus Authority	MTA Long Island Bus	New York, NY	http://www.mta.info/libus/
46	Long Beach Transit	LBT	Los Angeles, CA	http://www.lbtransit.com/
47	Ride-On Montgomery County Transit		Washington, DC	http://www.montgomerycountymd.gov/
48	Niagara Frontier Transportation Authority	NFTA	Buffalo, NY	http://www.nfta.com/
49	Charlotte Area Transit System	CATS	Charlotte, NC	http://charmeck.org/city/charlotte/cats/
50	Central Florida Regional Transportation Authority	LYNX	Orlando, FL	http://www.golynx.com/

Source: 2011 APTA Public Transportation Fact Book, 8-10

American Public Transportation Association (APTA)

Sustainability principles are relevant and on the agenda of the public transportation industry. Self-interest is one reason why these ideas have been adopted, at least in principle. For example, environmental performance pays dividends in terms of financial savings from energy and other utilities costs, service efficiency and community approval (APTA 2012).

As public transportation's largest and most powerful trade-association, APTA supports public transportation's efforts for environmental transformation in a number of ways. It maintains a sustainability department and has developed the APTA Sustainability Commitment program. This program enables APTA members to commit to a core set of specific actions on sustainability and APTA supports their efforts in achieving these actions through training, workshops, webinars and toolkits.

To address the three approaches to sustainability, APTA supports and encourages public transportation agencies to pursue improved environmental performance for the communities they serve by employing environmentally responsible practices in design and capital construction, such as using sustainable building materials, recycled materials, and solar and other renewable energy sources to make facilities as 'green' as possible. APTA also supports the utilization of sound practices in operations and maintenance, such as reducing hazardous waste, increasing fuel efficiency, creating more efficient lighting and using energy-efficient propulsion systems, such as alternative fuels. The third strategy they promote is for transit agencies to employ community-based strategies to encourage land use and transit-oriented development designed to increase public transit ridership and thereby improve regional air quality (APTA 2011).

Table 1.3: APTA Sustainability Commitment Core Principles for Transit Agencies



The core principles:

- Making sustainability a part of one’s organization’s strategic objectives.
- Identifying a sustainability champion within the organization coupled with the proper human and/or financial resources and mandates.
- Establishing an outreach program (awareness-raising and education) on sustainability for all staff of one’s organization.
- Undertaking a sustainability inventory of one’s organization. A list of indicators has been established below, outlining what needs to be measured and for which a baseline year needs to be determined based on data availability.
- Water usage per unlinked passenger trip and vehicle revenue mile.
- Criteria air pollutant emissions and water pollutant discharge per unlinked passenger trip and vehicle revenue mile.
- GHG emissions and GHG savings per unlinked passenger trip and vehicle revenue mile.
- Energy use (electricity, fuel) per unlinked passenger trip and vehicle revenue mile.
- Recycling levels/waste per unlinked passenger trip and vehicle revenue mile.
- Operating expense per unlinked passenger trip and vehicle revenue mile.
- Unlinked passenger trips per capita in service area of operation.
- VMT per capita in service area of operation.

Note: Techniques for measuring these indicators are still emerging and signatories are asked to make their best efforts.

Source: <http://www.apta.com/resources/hottopics/sustainability/Pages/default.aspx>

As the APTA Sustainability Commitment shows, having a formal commitment to sustainability is an important precursor to accomplishing environmental goals for public transit agencies. However, the term “sustainability” can be interpreted and defined in many different ways and is therefore difficult to formalize.

Environmental Management Systems and ISO

An environmental management system (EMS) is a formal tool that can be used to assist an organization in meeting its sustainability goals. It is a set of procedures and policies that define how an organization will manage its potential impacts on the natural environment and on the health and welfare of the people who depend on it. The EMS creates a system to assess, catalogue and quantify organizational environmental impacts (Darnall et al, 2000, 1) throughout the entire company.

One way to ensure the formalization of an EMS is for an organization to seek ISO 14001 certification for their environmental program. In 1996, as a result of the request of the United Nations Conference on Environment and Development (UNCED) four years earlier, the International Organization for Standardization (ISO) introduced ISO 14001, which was the first of the ISO family of environmental management systems standards. ISO 14001 is an even more formal procedure for setting up and maintaining an EMS program and the primary goals of ISO 14001 are twofold. First, it is designed to help businesses reduce their environmental impact while improving management control. Second, at a societal level, ISO is intended to facilitate sustainable development and foster international trade (Bansal and Hunter 2003, 289). ISO 14001 certification includes an external auditing function which can ensure specific objectives and targets are being met.

The ISO 14000 series is similar to the earlier ISO 9000 series published in 1987. The purpose of the ISO 9000 series is to encourage organizations to institute quality assurance management programs and is intended to encompass overall management of an organization at all levels. Both standards are concerned with processes, but ISO 14000 differs in that it is

specifically concerned with the management of the environmental effects of an organization.

There is debate and a lack of reliable information about the differences in tangible benefits derived from formal, certified EMS versus those from an informal or less rigorous set of environmentally focused activities (Melnyk, Sroufe and Calantone 2002, 329).

Chapter Summary

The U.S. public transportation system is complex and significant in size and scope. As such, it is difficult to uniformly apply sustainability principles across the industry. APTA, however, seeks to support organizations in their efforts to do this. Environmental management systems can be one tool used to aide in applying sustainability principles and these EMS systems can be formalized by achieving certification through ISO 14001. However, even with these tools available for organizations to design environmental and sustainability programs, implementation goals are not always met. The next section reviews literature on the reasons for the disparity between espoused and enacted environmental and sustainability goals.

Chapter 2 - Literature Review

"Never doubt that a small group of thoughtful, concerned citizens can change the world. Indeed it is the only thing that ever has."

— *Margaret Mead*

Chapter Purpose

This literature review briefly describes the history and current state of sustainability and environmental programs, broadly and in public transportation agencies in the U.S. This literature review discusses specific barriers to meeting the goals of environmental programs at U.S. public transportation agencies. As noted in Chapter 1, U.S. transit agencies vary greatly in terms of size, geographic region, population served and funding sources. Given the size and complexity of these transit systems, it is not surprising these agencies often struggle to apply sustainability, or any other organizational change to their core activities.

Sustainability in transportation extends beyond national, state and local political boundaries, and takes no notices of departments and divisions that are part of a transportation agency. True sustainability applies to every stage of decision-making: planning, design and implementation of projects and infrastructure, as well as day-to-day operations and maintenance (NCHRP 2011, 5). The following literature review identifies the barriers to leading environmental change in public transportation agencies and how to facilitate environmental programs that will protect community health, promote economic development and make positive environmental changes (NCHRP 2011, 1).

Barriers to Environmental Change

The environmental change process is complex. As with most change, arising difficulties must be overcome for change to be successful. These difficulties are summarized in a conceptual framework table (Table 2.1). The conceptual framework proposes three types of barriers to meeting environmental goals, and literature associated with each category is reviewed below. Post and Altman's "Barriers to Environmental Change" (1994) is a basis for determining two of the main barrier categories: organizational barriers and industry barriers. These categories are further parsed out with sub-categories created.

For this literature review and study, the category *organizational barriers* primarily focuses on public sector organizational issues; however, there is some applicability in the private sector which is not the core focus of this study. The *industry barriers* category is specific to public transportation where feasible. Additionally, a third barrier category, *financial barriers*, is utilized and is derived from a variety of sources, which are explored in detail below. Post and Altman (1994) do take some cost factors into consideration as a subset of the industry barrier category, but in this framework it is separated as its own category. Table 2.1 is the conceptual framework summarizing the literature reviewed below.

Table 2.1: Barriers to Environmental Program Implementation at Public Transportation Agencies

Barrier Type	Supporting Literature
<i>Organizational Barriers</i>	NCHRP (2011); Perry and Rainey (1988); Reichers, Wanous, and Austin (1997); Robertson and Seneviratne (1994)
Leadership/Top Management/Visible Champion	Burke (2002); Darnall <i>et al.</i> (2000); Fernandez and Rainey (2006); Melnyk, Sroufe, Calantone (2003); Post and Altman (1994); Yukl (2002)
Lack of Commitment	Fernandez and Rainey (2006); Robertson and Seneviratne (1995)
Lack of Communication	Armenakis and Bedeian (1999); Fernandez and Rainey (2006); Post and Altman (1994); Reichers, Wanous and Austin (1997); Robertson and Seneviratne (1995)
Attitudes of Personnel/ Employee Involvement	Fernandez and Rainey (2006); Freud (1920); Kets de Vries and Balazs (1999); Piderit (2000); Reichers, Wanous and Austin (1997)
Lack of Political Support	Fernandez and Rainey (2006); Van Bueren and De Jong (2007)
Administrative Inertia/Standard Operating Procedures	Brown (2005); DiMaggio and Powell (1983); Fernandez and Rainey (2006); Hannan and Freeman (1977); Hannan and Freeman (1984)
<i>Public Transportation (Industry) Barriers</i>	Post and Altman (1994)
Regulatory Constraints	DiMaggio and Powell (1983); NCHRP (2011); Post and Altman (1994); Van Bueren and De Jong (2007)
Insufficient Technical Knowledge and Expertise	Brown (2005); NCHRP (2011)
<i>Financial Barriers</i>	Burke (2002); Epstein (2008); Fernandez and Rainey (2006); Melnyk, Srouge and Calantone (2000); NCHRP (2011);
Personnel Costs	ISO 14001 (2004); Fernandez and Rainey (2006)
Capital Costs	APTA (2011); Post and Altman (1994)

Organizational Barriers to Change

Many managers and employees in hundreds of organizations have experienced the struggles, failures and frustrations that go along with changing the way business is done (Reichers, Wanous, and Austin 1997, 49). Organizational barriers impede any organization's ability to make desired changes, but public organizations struggle with different barriers than private organizations in terms of what limits their ability to change (Robertson and Seneviratne 1994, 548). For example, public agencies, including public transportation agencies, often lack market incentives and are instead mission-driven. These agencies striving to simultaneously achieve multiple and conflicting goals, answer to a broad range of political and constituency groups, may face higher demands for accountability, may operate under stricter regulatory standards, and have more rigid hierarchical arrangements (NCHRP 2011; Perry and Rainey 1988, 190).

Leadership and Visible Champion(s)

Strong leadership is key if an organization is to successfully adopt a new policy or progress changes within the organization (Burke 2002, 271; Yukl 2002, 273) including environmental change. When organizational leaders are detached or generally ambivalent about environmental issues or do not understand the relationship between environmental policies and economic return, the environmental change process suffers (Post and Altman 1999, 68).

Organizational managers are uniquely capable of adapting internal structures so that organizational changes can be implemented. As a result, these managers are therefore ideally

situated to be leaders of change in organizations (Fernandez and Rainey 2006, 3). In the case of environmental change, research shows that another factor for success is a visible environmental champion (Fernandez and Rainey 2006, 13). Some studies of organizational change have stressed the importance of having a single change agent or “idea champion” lead the transformation (Fernandez and Rainey 2006, 12). However, other research suggests the environmental champion role can be filled by either an individual or by a group within the organization (Yukl, 2002). Top managers need either to play those roles or strongly support those who do (Fernandez and Rainey 2006, 13). This theme is prevalent in nearly all literature reviewed on successful organizational change (Post and Altman 1994; Darnall *et al* 2000; Melnyk, Sroufe, Calantone (2003); Armenakis and Bedain 1999) because without strong leadership, the change will likely fail.

Commitment of Top Leaders

Support of environmental change policies from top leaders must be consistent for long-term interventions and for attempts at change to be successful. Achieving this level of commitment is not as easy as it may seem. For example, the highly political nature of the public arena can increase the difficulty of getting “whole-hearted” leadership support for the change process. Politics can impede consensus among organizational leadership regarding the necessity or importance of the change activity (Robertson and Seneviratne 1995, 548) and redirect the course of intended change.

When leaders fail to commit to a specific plan that “identif[ies] obstacles, and propos[es] measures for overcoming those obstacles” (Fernandez and Rainey 2006, 9), the plan likely lacks the teeth necessary for successful long-term change. Additionally, setting specific goals in a plan

helps to ensure that the policy implemented on the ground corresponds with the formal policy, as it was intended. Specified goal setting also limits the ability of implementing officials or managers to change the policy objectives, and it provides a standard to hold those responsible for implementing accountability (Fernandez and Rainey 2006, 10).

Communicating Change

Managerial leaders must verify and persuasively communicate the need for change (Robertson and Seneviratne 1995, 548). The process of convincing individuals of the need for change often begins with crafting a compelling vision for change. The vision is easy to communicate when it presents a clear picture of the future (Fernandez and Rainey 2006, 8). To this end, it is the responsibility of top organizational leaders or environmental champions to devise a strategy for reaching the stated and desired end state, with milestones and a plan for achieving each one. Ideally, the strategy should be clearly linked to causal theory for achieving the desired end state (Fernandez and Rainey 2006, 8). To be more specific, five core messages must be effectively communicated by top management. These are: (a) change is needed; (b) we have the capability to change successfully (i.e., self-efficacy); (c) it is in our best interest to change; (d) those affected support the change; (e) and the change is desirable for the organization (i.e., appropriateness) (Armenakis and Bedeian 1999, 9). Reichers, Wanous and Austin (1997, 53) state the importance of communicating change with spokespersons who are liked, trusted and credible, by using positive messages appealing to logic and consistency and using multiple channels and recognition to communicate the change.

Labor unions can share responsibility with upper level managers for failed change, even from the perspective of union members (Reichers, Wanous and Austin 1997, 49). Conversely,

change can be viewed more favorably if union officials are depicted as having real involvement in change processes by employees (Reichers, Wanous and Austin, 1997, 54) and are helping to disseminate the message to employees.

Attitudes of Personnel and Employee Involvement

Managerial leaders must build internal support for change and reduce resistance to it through widespread participation in the change process and other means (Fernandez and Rainey 2006, 10). Change can be difficult for employees. As Sigmund Freud notoriously wrote so long ago, “Repetition compulsion—the inclination to repeat past behavior in spite of the suffering attached to that behavior—is an all too human tendency” (1920, 62). This applies to humans at all levels, including those involved in organizations today.

As previously stated, a strong leader is necessary to communicate the change to the organization effectively. When this is not adequately demonstrated, the negative or resistant attitudes of employees can be a serious consequence. Anxiety associated with the uncertainty of engaging in something often prompts people to resist change (Kets de Vries and Balazs 1999, 8) and has serious implications regarding employee attitudes to the changes, including cynicism (Reichers, Wanous and Austin 1997). Successful organizational adaptation is increasingly reliant on generating employee support and enthusiasm for proposed changes, rather than merely overcoming resistance (Piderit 2000, 783).

In modern organizations, some employees expect to be involved in organizational change decisions. These employees, as well as the change process itself, benefit from the employee involvement. Open forms of participation that encourage discussion among employees and allow

employees to openly voice their ambivalence can result in employee approval and enthusiasm for proposed changes (Piderit 2000, 783).

When these needs are not met, however, employees are more likely to become cynical about the change, which is a major barrier. Employees who reported feeling cynical in Reichers, Wanous and Austin's *Study of Cynicism About Change* (1997) were more likely to do so when they reported feeling that they lacked meaningful opportunities to participate in decision making, felt uninformed in general about what was going on in the work place, and had supervisors and union representatives they felt were lax about communicating with them. Reichers, Wanous and Austin (1997) have developed strategies to manage and mitigate cynicism about organizational change which include involving employees in making decisions that affect them, keeping employees informed of ongoing changes, acknowledging past mistakes in change processes and providing opportunities for employees to express feelings and receive validation.

Political Support

Political institutions are often held responsible for the failure of sustainability policies (Van Bueren and De Jong 2007, 549). This is logical because many transit agencies function at the will of their Boards of Directors, which are frequently comprised of elected officials. Political will changes on a short time line of no more than four years, and the preoccupation with votes that politicians endure is sometimes at the expense of environmental concern (Van Bueren and De Jong 2007, 549).

In the public sector, political authorities often mandate that agencies undergo various types of change which undermine programs currently being implemented, and which conflict with the prioritization of resources needed to achieve a given goal or to implement a given

policy. This severely limits the ability of managers and leaders to structure their organizations to effectively and consistently implement change (Fernandez and Rainey 2006, 3-4).

Administrative Inertia/Standard Operating Procedures

Organizations function in an institutional environment rich with public and private stakeholders and authorities. The norms, values, rules and cognitive systems are a result of this institutional environment. Conforming to these aforementioned systems of ever changing stakeholders can be a catalyst driving organizations to change (Fernandez and Rainey 2006, 3; DiMaggio and Powell 1983).

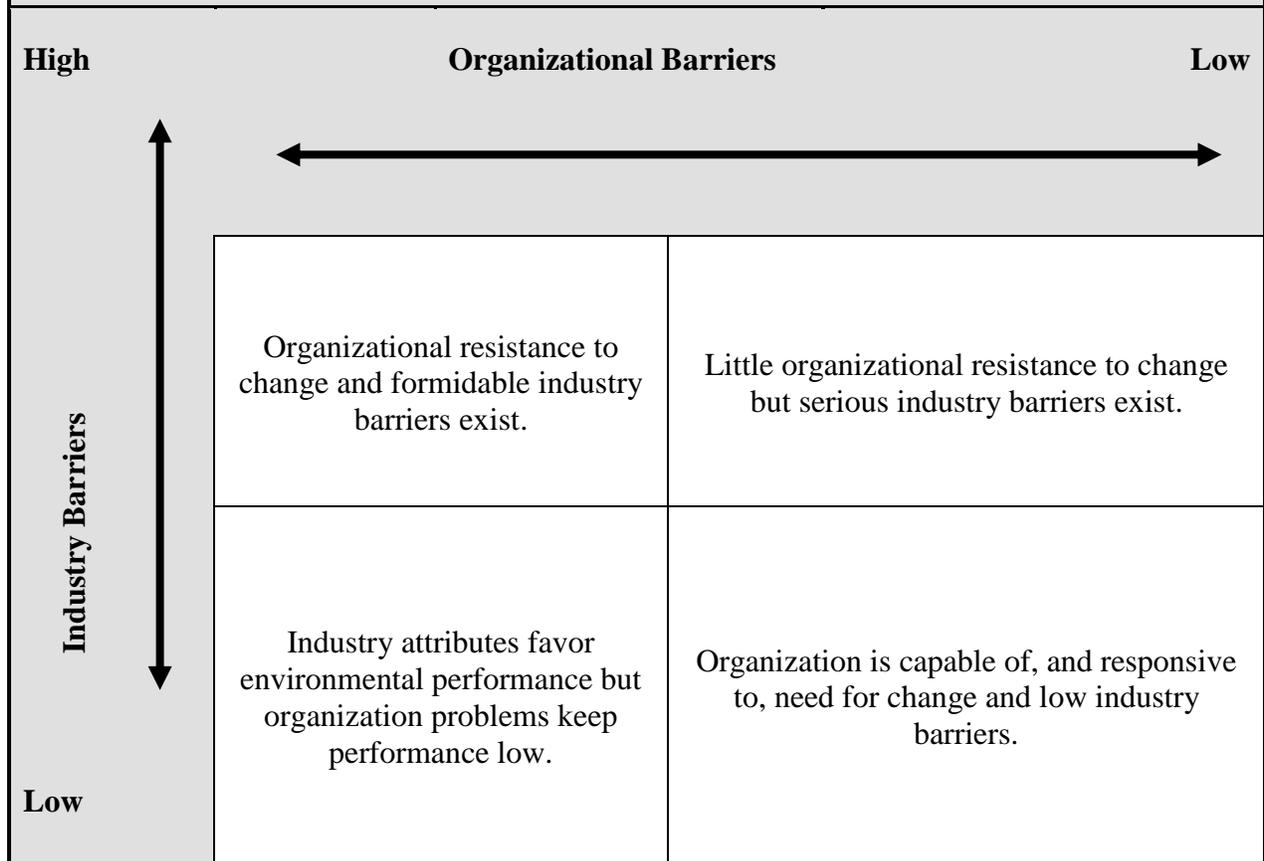
A complicating factor contributing to the reason change is difficult, even in spite of the demand for change, is when integrated environmental management approaches are superimposed onto conventional administrative regimes. In these instance, there will inevitably be a number of administrative impediments (Brown 2005, 455), which can possibly stem from overlapping and undefined responsibilities or a lack of organizational commitment to changing implementation practices (Brown 2005, 405).

Additionally, for many organizations, there are strong inertial pressures on both internal and external organizational structures that can inhibit change (Hannan and Freeman 1977, 957). Some factors that generate internal structural inertia include sunk cost in facilities, equipment and personnel, the dynamics of political coalitions and the tendency for precedents to become normative standards (Hannan and Freeman 1984, 149).

Industry Barriers - Public Transportation

Industry barriers can represent a first wave of obstacles for companies to overcome in improving environmental performance (Post and Altman 1994, 67). Industry barriers include regulatory constraints, the lack of necessary information or data, and insufficient technical knowledge or expertise. Where industry barriers are relatively low, opportunities for successful environmental performance are high (Post and Altman 1994, 68). Post and Altman have developed a model (see Figure 2) showing that when a company or agency can mitigate their organizational barriers and simultaneously their industry barriers, then the outcome for successful environmental program implementation is highest.

Figure 2.1: Opportunity for environmental program implementation



Organizational barriers include: Leadership/Top Management/Visible Champion, Lack of commitment, lack of communication, lack of political support, attitudes of personnel/employee involvement, labor/union issues, administrative history and standard operating procedures.

Industry barriers include: regulatory constraints, insufficient information and data, and insufficient technical knowledge and expertise.

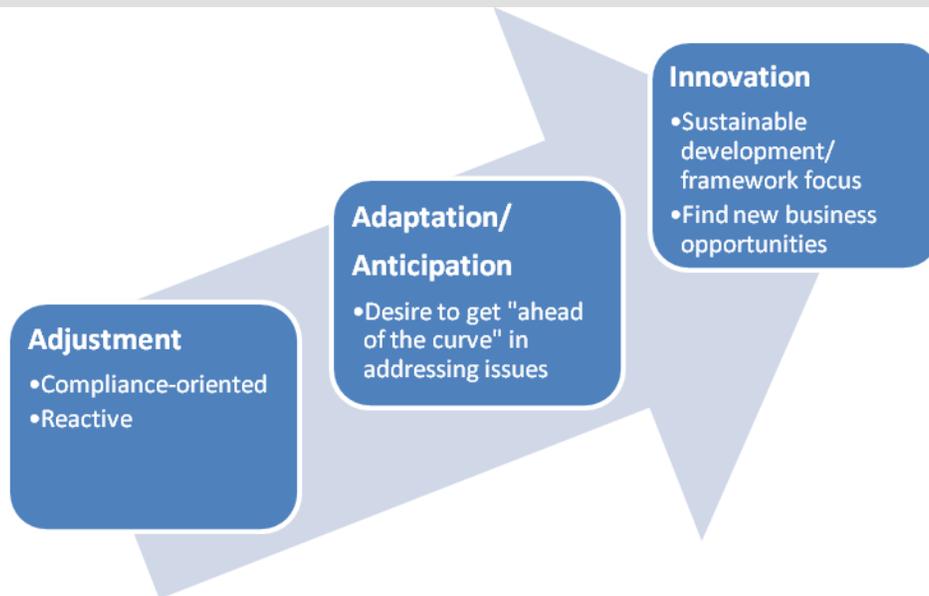
Source: Post and Altman 1994, 69

Regulatory Constraints

Regulatory constraints are minimum functional requirements for operating. They are compliance-based in nature, such as meeting federal, state and local regulations, and operating permits. Due to their fundamental function of meeting minimum requirements, they hinder innovation by providing no incentive for tackling broader organizational and societal goals (Post and Altman 1994, 70; Van Bueren and De Jong 2007, 547). The presence of an authorizing environment and the specific legislative mandates that influence operations affect how sustainability is implemented (NCHRP 2011, 5), and the existence of this legal environment can negatively affect many aspects of an organization's behavior and structure (DiMaggio and Powell 1983, 150) by causing unnecessary inefficiencies.

A “corporate greening model” (see Figure 2; Post and Altman 1994, 70) shows the regulatory phase as the first phase of implementing an environmental program. As environmental performance progresses, two additional phases are achieved. The three phases are: Phase 1: Adjustment; Phase 2: Adaptation and Anticipation; and Phase 3: Innovation. The model can be used to assess which phase of environmental program implementation the organization is in and employees can benefit from understanding where their organization is on the “environmental performance curve” and overcome transitional barriers accordingly (Post and Altman, 71).

Figure 2.2: Corporate Greening Model



Source: Post and Altman (1994)

Insufficient Technical Knowledge and Expertise

Sustainability, due to its multi-dimensionality, necessitates a broader knowledge and skill base than the conventional administrative system of silos of responsibility (Brown 2005, 465).

Quantifying sustainability goals and objectives using performance measures can be a daunting task on account of the large number of possible measures, the extensive and potentially expensive data required, and the computational complexity that is often needed (NCHRP 2011).

Much of the information required for this quantification is already collected and utilized for other organizational purposes. There are, however, several factors that can inhibit the widespread application of data sharing, even internally at an organization. Inconsistencies in definitions, differing data collection methods and difficulty with the appropriate staff having access to the data can all inhibit the functional utility of the data.

Transportation professional organizations and trade associations could improve the quality of transportation-related statistics to facilitate transportation research, policy analysis and planning, with relatively little cost by assisting in best practices methods (Litman 2010). To this end, the National Cooperative Highway Research Program (NCHRP) has developed Report 708 (2011) which is a guidebook with practical information and easy-to-apply approaches toward sustainability related performance measures. Additionally, it provides a reference compendium of performance measures to aid in the application of sustainability programs.

Financial Barriers

“Can anybody remember when the times were not hard and money not scarce?”

-Ralph Waldo Emerson, 1870

Due to the recent recession, public transportation systems are facing unprecedented funding challenges on account of widespread declining state and local revenues, and have been forced to take a number of critical actions which include raising fares, cutting service, and laying off employees (APTA 2010).

Resource scarcity can hinder organizational changes (Fernandez and Rainey 2006, 15) and financial resources are a significant factor in any type of organizational change. Successful

change requires sufficient personnel to support the process. Consistently, the literature reviewed states that environmental program implementation is a potentially expensive undertaking (Fernandez and Rainey 2006, 14; Melnyk, Sroufe, Calantone 2003, 334; NCHRP 2011), not least due to the capital investment potentially required.

Other costs associated with planned organizational change include the development of the new plan or strategy, communicating the need for change as well as the new policies, training employees, developing new processes and practices, restructuring and reorganizing the organization, and testing and experimenting with innovations (Burke 2002; Fernandez and Rainey 2006, 15). Measuring and communicating the financial payoffs of sustainability is a difficult but critical piece of the environmental performance package (Epstein 2008, 57; NCHRP 2011) as well.

Personnel Costs

Environmental programs are expensive and time consuming to implement (NCHRP 2011). For instance, to implement an ISO 14001 certified environmental management system, there are 17 specific requirements organization must undertake; each with sub-requirements that must be fulfilled in an exact way. Each element requires significant training and has a significant time requirement (ISO 14001:2004(E)) for a core environmental team. Since the 2010 recession, public transit systems have taken significant personnel actions to reduce spending (APTA 2010), which includes 68 percent of all public transportation systems having eliminated positions or are considering doing so in the future (APTA 2010).

As the ISO 14001 example illustrates, a serious concern for organizations intending to implement an environmental program is the lack of dedicated personnel to carry the task out, and

this is exacerbated by the unprecedented funding challenges facing the agencies. One result of failing to provide adequate personnel resources is employees tasked with implementing new environmental programs may neglect core organizational activities and functions (Fernandez and Rainey 2006, 15).

With environmental program implementation, there are opportunities for personnel efficiencies, however. Comprehensive organizational changes that require small amounts of similar resources can result in synergies (Fernandez and Rainey 2006, 15). The end result of employees working together and each contributing small amounts can increase the likelihood that all changes will be implemented successfully.

Capital Costs

“It's been proven time after time: investments in our national infrastructure create jobs and opportunities. Americans can and must build great things – not just in spite of enormous economic challenges but also as the means of overcoming them.”

- Secretary Ray LaHood, Department of Transportation

Capital costs are those funds needed for major and minor environmental improvements. They are quantified by the expected rate of return for all environmental projects (Post and Altman 1994, 68).

Investments that can be considered a capital investment for environmental and sustainability projects are innumerable. For example, they can include renewable energy technology, such as solar and wind power on administrative buildings, parking facilities or bus stops. More efficient fleet vehicles are a common consideration, such as those using a renewable fuel source such as biofuels or other alternative technology like electric, natural gas or hydrogen-

powered vehicles, for example. Capital costs also include retrofitting projects that replace less efficient technologies with newer and more efficient ones. Efficiency improvements can be made in the areas of lighting, heating and cooling equipment, mechanical equipment, general building overhauls and landscaping to name a few.

In today's economy, most public transit agencies are having a difficult time meeting their operations budgets, so gaining support and approval for funding to invest in new technology is a significant barrier (APTA 2011). In addition, 54 percent of public transportation systems responding to APTA's 2010 survey on funding had transferred funds from capital use to operations, thus aggravating efforts to keep systems in a state of good repair (APTA 2010), or invest in environmental capital projects.

Chapter Summary

This literature review shows that specific barriers can impede the achievement of meeting environmental program goals, and the barriers must be overcome to ensure successful implementation. The three main barrier categories are *organizational*, *industry* and *financial*.

In the organizational barrier category, the key barriers to overcome are ensuring that top management is committed to the environmental change efforts and that the leadership supports the effort. It is necessary the goals and the plan are clearly communicated to employees, and the employees are able to participate in the change process. The support and plan must be strong enough to ignore the possible external political influences that can permutate or undermine the direction of the environmental change process. By overcoming these barriers, the attitudes of employees will not suffer from the change process, which increases the chance of success.

The administrative and bureaucratic nature of public agencies presents a substantial barrier to overcome. In the transportation field, responsibilities are divided between various levels of government, and departments are compartmentalized. Top leaders must transcend these boundaries and demarcations to achieve environmental program goals. Similarly, progressive thinking is necessary to move past the regulatory compliance mindset and into the realm of solving problems and creating innovative solutions.

Public transportation agencies may lack the necessary technical knowledge or expertise to plan and execute environmental programs, and additional personnel and capital expenditures are often difficult to obtain. Looking to trade organizations such as APTA and the NCHRP for technical assistance is a means of overcoming this barrier.

When all efforts are combined, and the barriers are overcome, the result is an environmental program meeting the social, economic and environmental expectations of the communities these organizations serve.

Chapter 3 - Methodology

Chapter Purpose

Chapter 3 introduces the methodology used to achieve the project's purpose. The conceptual framework of barriers to meeting environmental program goals is operationalized into survey questions. Survey research was chosen as the most appropriate technique to achieve the research purpose because it allows for the collection of data from a diverse set of transit agencies and is easy to aggregate.

This chapter further justifies survey research through a discussion of its strengths and weaknesses as well as how the survey tool was vetted to ensure it produced reliable and valid results. The study population is also discussed and the statistical methods used to analyze the results are presented.

Research Method

As described in detail in Chapter 1, the public transit network in the U.S. is complex. It is made of large and small agencies, each offering a unique set of services to distinct populations. Their geographic boundaries differ as well as their funding structures and political climates. In light of these factors, survey research was chosen as the most appropriate method to collect data from these entities and operationalize the conceptual framework of this study.

Surveying is a popular research tool with many advantages and some disadvantages. According to Ronald Czaja and Johnny Blair's (2005, 3-5) "Designing Surveys: A Guide to

Decision and Procedures,” a project must pass three tests before choosing survey research for data collection. First, “the target population must be clearly defined.” Next, survey respondents must be able to answer questions asked. Last, the survey must have a clearly defined goal. This project meets those three tests. The population is clearly defined as all current signatories of the APTA Sustainability Commitment. The questions were specifically designed for environmental program managers (EPMs) and finally, this survey has a clearly defined goal to describe the EPM’s level of agreement with the barriers to meeting environmental program goals that were identified from the literature.

The population chosen to study the barriers to meeting environmental program goals in U.S. public transit agencies are those agencies that have signed on as APTA Sustainability Commitment Signatories (APTA 2012) as of March, 2012 (N = 84). The full list of APTA Sustainability Commitment Signatories is reported in Table 3.1. The signatory list includes both private and public signatories. Corporate signatories are referred to as APTA Business Members and are entities such as transportation vehicle manufactures, transportation consulting entities, transportation software developers and architecture firms, for example. The APTA Business Members (N = 37) are indicated in Table 3.1 with a “(B)”. The rest of the signatory list is comprised of Transit Agencies (N = 47) which are indicated in Table 3.1 with an “(A)”. This study examines the results of the public transit agency signatories’ survey responses (N = 17), those identifying themselves as APTA business members (N = 10) and those identifying themselves as “other” (N = 4) survey responses as well.

Table 3.1 APTA Sustainability Commitment Signatories

Gold Level	
South Coast British Columbia Transportation Authority (Translink) (A)	
Silver Level	
Foothill Transit (A)	
Sound Transit (A)	
Bronze Level	
Greater Cleveland Regional Transit Authority (A)	
IMPulse NC, Inc.(B)	
San Mateo County Transit District, SAMTRANS bus service (A)	
Entry Level	
ABC Companies (B)	Los Angeles County Metropolitan Transportation Authority (A)
AECOM (B)	Macro Corporation (B)
Agence métropolitaine de transport (Montreal) (A)	Maintenance Design Group (B)
American Logistics Company (ALC) (B)	Metropolitan Atlanta Rapid Transit Authority (A)
Architect for Life (B)	Miami-Dade Transit (A)
Atkins, North America (A)	MOBILITY Transit Services, LLC (B)
Ben Franklin Transit (A)	Mountain Metropolitan Transit (A)
BikeLid LLC (B)	MTA New York City Transit (A)
Bombardier Transit Corporation (B)	National Railroad Passenger Corp. (Amtrak) (A)
Capital Metro (A)	New Flyer of America (B)
CDM (B)	NJ Transit (A)
Champaign-Urbana Mass Transit District (A)	North County Transit District (A)
Chapel Hill Transit (A)	Orange County Transportation Authority (A)
Chatham Area Transit Authority/Veolia Transportation (A)	Paragon Project Resources, Inc. (B)
Clever Devices (B)	Paratransit Inc. (A)
Corpus Christi Regional Transportation Authority (A)	Parsons Brinckerhoff (B)
Dallas Area Rapid Transit (A)	Parsons Transportation Group Inc. (B)
DRI Inc (B)	Philips Lighting Co. (B)
ERM West Inc. (B)	Pinellas Suncoast Transit Authority (A)
GENIVAR Consultants (B)	Proterra LLC (B)
GFI-Genfare (B)	The Rapid (A)
Gilbert Tweed Associates (B)	Regional Transportation Authority (Chicago) (A)
Golden Empire Transit District (A)	RNL Design, Inc. (B)
Greater Bridgeport Transit Authority (A)	San Francisco Municipal Transportation Agency (SFMTA) (A)
Greater Lynchburg Transit Company (A)	San Francisco Bay Area Rapid Transit District (BART) (A)
Greater Peoria Mass Transit District (A)	Santa Clara Valley Transportation Authority (VTA) (A)
Halcrow, Inc. (B)	Sharon Greene and Associates (B)
Hampton Roads Transit (A)	Southeastern Pennsylvania Transportation Authority (SEPTA) (A)
HDR, Inc. (B)	Stacy and Witbeck, Inc. (B)
Indianapolis Public Transportation Corporation (IndyGo) (A)	Telvent Transportation North America (B)
Infraconsult (B)	Transit Authority of River City (A)
Intercity Transit (A)	Transit Marketing Group (B)
King County Dept. of Transportation, Metro Transit Division (A)	Triangle Transit (A)
Lane Transit District (A)	TriMet (A)
Lea+Elliott, Inc. (B)	URS Corporation (B)
Legacy Resource Group (B)	Utah Transit Authority (A)
Lin Industries, Inc. (B)	Valley Metro Rail, Inc. (A)
Long Beach Public Transportation Corporation (A)	Via Metropolitan Transit (A)
LogicTree Corporation (B)	Visual Marking Systems (B)
Source: APTA 2012	

Other research techniques such as direct observation, content analysis and/or interview research may be affected by individual associations' perceptions of issues, making general observations difficult to interpret. Babbie explains that survey research prevents these problems by "ask(ing) exactly the same questions of all subjects and having to impute the same intent to all respondents giving a particular response" (2004, 287). In other words, generalized survey questions allow diverse groups to be polled using common measures and are unlikely to misinterpret the response options. Survey research offers an advantage to participants as well; completing a survey can be done at the respondents' convenience without any excessive commitment on the part of the individuals (Salant and Dillman 1994, 9).

Likert-designed survey questions were the method chosen for this survey. A Likert item is simply a statement that the respondent is asked to evaluate according to any kind of subjective or objective criteria; generally the level of agreement or disagreement is measured. It is considered symmetric or "balanced" because there are equal amounts of positive and negative positions (Burns and Bush 2008, 250). Additionally, as Burns and Bush (2008, 245) point out, the Likert scale can be a benefit because when responding to a Likert questionnaire item, respondents specify their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements. Thus, the range captures the intensity of their feelings for a given item, while the comprehensive results of the analysis of multiple items (if the items are developed appropriately) reveals a pattern that has scaled properties. For this survey, the Likert scale used is: Strongly Disagree = 5, Disagree = 4, Neutral = 3, Agree = 2, Strongly Agree = 1.

To test public transit environmental program managers' opinions on the presence of each barrier category, the survey asked all participants to respond to the same set of statements. The Likert scale offers an additional advantage to this study because of "the unambiguous ordinality of response categories" (Babbie 2004, 179).

While survey research has many advantages, survey research is limited to one person's perception at one moment in time, and this is a limitation. As Babbie (2004, 288) points out, "people's opinion on issues seldom take the form of strongly agreeing, agreeing, disagreeing or strongly disagreeing." Accordingly, an EPM's response to statements on the Likert scale could vary by day based on mood or recent events. A weakness of this project is the lack of triangulation. However, Babbie notes (2004, 288), "full awareness of the inherent or probable weaknesses of survey research can partially resolve them in some cases...researchers are on the safest ground when they can employ several research methods in studying a given topic." To address this limitation, the researcher is forthcoming about any concerns with data validity and reliability. Additionally, three of the research questions were reverse-coded to account for reliability. These questions are indicated in the operationalization tables (Table 3.2, 3.3 and 3.4 with an (R)).

A link to the electronic survey was sent via email to the primary contact listed for each signatory. Ideally, at each entity, the primary contact is the person responsible for meeting and reporting on the status of the environmental program and is in the best position to answer the survey questions. While the titles of the primary contacts undoubtedly vary from organization to organization, they will be referred to as environmental program managers (EPMs) for the purpose of discussing the survey and results.

The survey method included sending the initial survey and two subsequent email reminders. As a result, 31 survey responses were received (R=37%). This response rate is in line with other electronic and email surveys (IAR, 2012).

This survey was unique because in addition to operationalizing the conceptual framework of this study using the standard Likert scale questions in the survey, other research is incorporated. Petra Mollet, Vice President of Strategy at APTA, is completing a research project designed specifically to assess employee engagement of APTA Sustainability Signatories. Mollet's survey questions were incorporated into the same survey and sent out together as one survey. Two of Mollet's questions were multiple choice, asking EPMs to choose from the following list of percentages: Under 10%, 11% - 30%, 31% - 50%, 51% - 75%. Mollet's questions that fit into the conceptual framework of identifying barriers to meeting environmental program goals are incorporated into the analysis and noted in the operationalization tables below (Tables 3.2, 3.3 and 3.4) with an asterisks (*).

Variables

The three main barrier categories identified from the literature were *organizational barriers*, *industry barriers* and *financial barriers*. Each of the three categories is further defined through a series of sub-categories. In this project, these categories and sub-categories are used as a conceptual framework to create a survey, gathering evidence from the APTA Sustainability Signatories. The conceptual framework is operationalized through the categories and sub-categories becoming variables. A discussion of the survey statements for each category is below.

Organizational Barriers

The survey measures EPMs' views as to whether or not specific organizational barriers were present in their respective transit agencies. Seven different dimensions of organizational barriers were identified in the literature. The questions for each of these dimensions are presented in the operationalization of the conceptual framework table (Table 3.2) and explained below.

Table 3.2 Operationalization Table - Survey Questions Developed from the *Organizational Barriers* Category of Environmental Program Goal Barriers

<i>Organizational Barriers</i>	
Category	Survey Questions
Leadership/Top Management	The leadership at my agency supports our environmental program.
Visible Champion	There a visible environmental champion leading the environmental program at my organization. Everyone in my organization recognizes this person.
Lack of Commitment	My organization is strongly committed to implementing its stated environmental goals, including those goals in the APTA Sustainability Commitment.
Lack of Communication	My organization's environmental goals clearly communicated by top management or the environmental champion. What percentage of employees do you estimate are aware of your organization's commitment to environmental sustainability?*
Attitudes of Personnel/Employee Involvement	The employees at my agency view our environmental program favorably. What percentage of employees do you estimate are engaged in developing, implementing and advancing your organization's environmental initiative(s)?*
Lack of Political Support	There is political support for the environmental program, including the Board of Directors or other external decision making body. There is external community support for my organization's environmental program.
Administrative Inertia/Standard Operating Procedures	Existing standard operating procedures get in the way of implementing our environmental program. (R)

The category leadership and top management is important because strong leadership is a key if an organization is to successfully adopt a new policy or progress with changes within the organization. To understand EPMs' views on leadership support, they were asked to rate the statement, "*The leadership at my organization supports our environmental program.*" using the 5-point Likert scale previously described. This question will indicate whether EPMs feel that the leadership and/or top management at their organizations supports their environmental program. It is proposed that if there is strong leadership support this will not be a barrier to successfully implementing environmental programs, but if there is a lack of leadership support, meeting environmental program goals will be negatively affected.

Having a visible environmental champion is another factor for success in organizational change. EPMs were asked to rate the statement on the same 5-point Likert scale, "*There is a visible environmental champion leading the environmental program at my organization. Everyone in my organization recognizes this person.*" If there proves to be a lack of a visible champion, it is proposed that it will negatively affect whether environmental program goals being met.

Commitment is important because support must be consistent for long-term attempts at change to be successful (Robertson and Seneviratne 1995, 548). EPMs were asked to rate the statement, "*My organization is strongly committed to implementing its stated environmental goals, including those goals in the APTA Sustainability Commitment*". This question will indicate whether or not EPMs think they are being supported by top management in their environmental program endeavors.

For change to be successful, organizational leaders must effectively verify the need and persuasively communicate it. The EPMs were asked to rate their agreement on the 5-point Likert scale, *“My organization's environmental goals are clearly communicated by top management or the environmental champion.”* This question will indicate whether or not they perceive that top management or another internal entity effectively communicates the organization's environmental goals. EPMs were also asked to choose from the multiple choice categories previously described, *“What percentage of employees do you estimate are aware of your organization's commitment to environmental sustainability?”* This question was designed as a measure to assess employee engagement for Mollet's research; however, this question is appropriate to gauge communication, because it will indicate the EPM's perception of employee's awareness of the environmental program.

Attitudes of personnel are important because employees are an integral part of building internal support for change and reducing resistance to it. EPMs were asked to rate on the 5-point Likert scale, *“The employees at my organization view our environmental program favorably.”* This question will indicate the EPMs perception of how the other employees at the organization view the environmental program. To assess the level EPMs perceive other organizational employees to be involved in the environmental program, they were asked to choose from multiple-choice categories, *“What percentage of employees do you estimate are engaged in developing, implementing and advancing your organization's environmental initiative(s)?”* It is proposed that higher levels of employee involvement will reflect favorably in whether or not environmental goals are being met.

When political support is lacking, it can be severely limiting factor in the ability of managers to effectively and consistently implement change (Fernandez and Rainey 2006, 3-4).

EPMs were asked to rate the following statement on a 5-point Likert scale, “*There is political support for the environmental program, including from the Board of Directors or other external decision making body.*” The EPMs response will indicate whether or not they perceive having political support from decision making bodies at their organizations. Additionally, to gauge whether political support is a barrier to meeting environmental program goals, respondents were asked to rate the question, “*There is external community support for my organization's environmental program.*” on a 5-point Likert scale. The response to this question will lead to assessing whether EPMs perceive that their community supports the environmental programs at their organizations.

The final organizational barrier discussed in the organizational barrier category is administrative inertia/standard operating procedures. This category is important because the norms, values and rules and cognitive systems are deeply ingrained in the institutional environments that these organizations function in (DiMaggio and Powell 1983) so it is important that they are favorable for environmental change. To that end, EPMs were asked to rate on the same 5-point Likert scale whether they thought, “*Existing standard operating procedures get in the way of implementing our environmental program.*” This question was reverse-coded for reliability and it will indicate whether or not EPMs think that administrative inertia and standard operating procedures are barriers to successfully implementing environmental programs.

Industry Barriers

The survey tested EPMs’ views as to whether or not industry barriers were present. Within the industry barriers category the questions were designed to assess whether there were issues with regulatory constraints and insufficient knowledge and expertise.

Table 3.3 Operationalization Table - Survey Questions Developed from the Industry Barriers Category of Environmental Program Goal Barriers	
<i>Industry Barriers</i>	
Category	Survey Questions
Regulatory Constraints	Regulatory constraints hinder innovation that could lead to meeting environmental program goals. (R)
Insufficient Technical Knowledge and Expertise	Staff at my organization have adequate technical knowledge and expertise to quantify, implement and report on environmental programs.

Regulatory Constraints are important because they are minimum functional requirements for operating and as such, they can hinder innovation by providing no incentive for tackling broader organizational and societal goals (Post and Altman 1994, 70; Van Bueren and De Jong 2007, 547). To understand whether EPMs consider this a barrier to meeting environmental program goals at their organizations, EPMs were asked to rate on the 5-point Likert scale if, “*Regulatory constraints hinder innovation that could lead to meeting environmental program goals.*” It is proposed that this will not be a major consideration for EPMs and the response for it being a significant factor will be close to neutral.

Because administering sustainability and environmental programs necessitates a broader knowledge and skill base than the conventional administrative system (Brown 2005, 465), assessing whether EPMs perceive insufficient technical knowledge and expertise as a barrier to implementing programs is important. To assess the EPMs views on this, they were asked to rate their level of agreement with the statement, “*Staff at my organization have adequate technical*

knowledge and expertise to quantify, implement and report on environmental programs and goals.” on the 5-point Likert scale.

Financial Barriers

The survey tested environmental program managers’ views as to whether or not financial barriers were present. Within the financial barriers category, the survey tests whether personnel costs and capital costs are barriers to meeting their environmental program goals.

Table 3.4 Operationalization Table - Survey Questions Developed from the Financial Barriers Category of Environmental Program Goal Barriers.	
<i>Financial Barriers</i>	
Category	Survey Questions
Personnel Costs	At my organization, we lack the necessary to funding to support an adequate environmental staff. (R)
Capital Costs	My agency adequately invests in capital projects designed to meet environmental program goals.

Personnel costs are important because environmental programs are expensive and time consuming to implement (NCHRP 2011). To assess whether EPMs consider personnel costs a factor in meeting environmental program goals at their organizations, they were asked to rate their level of agreement on the 5-point Likert scale, *“At my organization, we lack the necessary funding to support an adequate environmental staff.”*

Similarly, capital costs are important because investing in more efficient technology can result in significant cost savings later, and in today’s economy, capital investment is often one of

the first items cut from the budget. To assess whether capital cost investment is considered a barrier to implementing their environmental programs, EPMs were asked to rate their level of agreement on the 5-point Likert scale with the statement, “*My organization adequately invests in capital projects designed to meet environmental program goals.*”

Chapter Summary

This chapter has presented the methodology of this research which includes a survey tool used to describe barriers to meeting environmental program goals. The survey was derived from the categories in the conceptual framework, which was derived from the literature review. Each question was discussed as it relates to the conceptual framework. The next chapter presents the results of the survey and analyzes the frequencies of each variable. A copy of the complete survey tool is also available in the appendix.

Chapter 4 – Findings/Results

This chapter reviews, analyzes and discusses the results of the survey given to the environmental program managers (EPMs) at the various organizations that are APTA Sustainability Commitment Signatories.

Organizational Barrier Findings

Table 4.2 shows the individual frequencies by number and percent for each survey question designed to measure perceived organizational barriers. Overall, the EPMs do not agree that the specific barriers discussed above are present in their organizations. Each category and survey question is discussed in detail in the following paragraphs.

In the “Leadership/Top Management” category, 90 percent of respondents felt that the leadership at their organization supported their environmental program. However, 10 percent said that they were “neutral” suggesting a concern from these EPMs. This indicates that of the organizations responding to the survey, “Leadership/Top Management” support is not a barrier to meeting environmental program goals in most cases.

Regarding whether there is a visible champion at the responding EPM’s organization, only one respondent disagreed that there was a visible champion at their organization, while 26 percent responded neutrally, and 71 percent of EPMs responding felt that there is a visible champion at their organization. For the majority of these organizations, the lack of a visible champion is not a barrier.

Pertaining to organizational commitment, 70 percent of responding EPMs agreed or strongly agreed that their organization is committed to implementing its stated environmental goals. Twenty-three percent were neutral and 7 percent disagreed with this statement.

In the “Lack of Communication” category, 64 percent of respondents agreed or strongly agreed that environmental program goals are clearly communicated to all staff. However, 10 percent of EPMs disagreed or strongly disagreed with that statement. The remaining 26 percent provided a neutral response, indicating that there may be significant deficiencies in the effectiveness of the environmental program communications.

Also in the “Lack of Communication” category, Mollet’s question to gauge employee awareness was broken down into percent categories. It indicated that 58 percent of EPMs surveyed estimated that a majority of employees were aware of their organization’s commitment to their environmental programs. Forty-two percent of EPMs estimated that 50 percent or fewer employees were aware of the organization’s commitment.

Fifty-eight percent of organizations surveyed thought that employees at their organization view their environmental program favorably. Thirty-nine percent of EPMs provided a neutral response to this question and one EPM disagreed with the statement. However, responding to Mollet’s question on employee engagement, relatively few felt that a majority of employees were engaged in developing, implementing and advancing their organizations environmental initiatives. Only thirty percent of EPMs thought that a majority of employees were engaged in the development, implementation and advancement of the program. Fifty-two percent of the EPMs surveyed estimated that less than 30 percent of their organization’s employees were involved.

Regarding the “Lack of Political Support” category, both questions received a high frequency of neutral responses (29 percent and 32 percent, respectively) indicating that this may or may not be a concern for EPMs. Overall, regarding the support from a Board of Director or other decision making body, 68 percent of EPMs agreed or strongly agreed that there was support. Only one respondent strongly disagreed and no respondents simply disagreed. In terms of external community support, 61 percent either agreed or agreed strongly that there was community support. Two respondents, or 7 percent strongly disagreed with this statement, and no respondents simply disagreed.

The category “Administrative Inertia/Standard Operating Procedures” was operationalized by asking EPMs to answer a reverse-coded survey question whether standard operating procedures were barriers to meeting environmental program goals. Sixty-one percent, disagreed or strongly disagreed that SOPs are a barrier at their organization. However, of the remaining 39 percent, 16 percent provided a neutral response and 23 percent of respondents agree or strongly agree that SOPs are a barrier. This indicates that for nearly forty percent of EPMs surveyed, SOPs can interfere in meeting environmental program goals.

Table 4.1 - Organizational Barrier Findings

Category	Questions	Frequencies				
		Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
Leadership/Top Management	The leadership/top management at my organization supports our environmental program.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	0 (0%)	3 (10%)	9 (29%)	19 (61%)
Visible Champion	There a visible champion leading the environmental program at my organization. Everyone in my organization recognizes this person.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	1 (3%)	8 (26%)	8 (26%)	14 (45%)
Lack of Commitment	My organization is strongly committed to implementing its stated environmental goals, including those goals in the APTA Sustainability Commitment.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	2 (7%)	7 (23%)	6 (19%)	16 (52%)
Lack of Communication	My organization's environmental goals are clearly communicated by top management or the environmental champion.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		1 (3%)	2 (7%)	8 (26%)	9 (29%)	11 (35%)
	What percentage of employees do you estimate are aware of your organization's commitment to environmental sustainability?	Under 10%	11% - 30%	31% - 50%	51% - 75%	Over 75%
		3 (10%)	3 (10%)	7 (22%)	6 (19%)	12 (39%)
Attitudes of Personnel/Employee Involvement	The employees at my organization view our environmental program favorably.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	1 (3%)	12 (39%)	11 (36%)	7 (23%)
	What percentage of employees do you estimate are engaged in developing, implementing and advancing your organization's environmental initiative(s)?	Under 10%	11% - 30%	31% - 50%	51% - 75%	Over 75%
		8 (26%)	8 (26%)	6 (19%)	2 (6%)	7 (23%)
Lack of Political Support	There is political support for the environmental program, including the Board of Directors or other external decision making body.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		1 (3%)	0 (0%)	9 (29%)	9 (29%)	12 (39%)
	There is external community support for my organization's environmental program.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		2 (7%)	0 (0%)	10 (32%)	10 (32%)	9 (29%)
Administrative Inertia/Standard Operating Procedures	Existing standard operating procedures get in the way of implementing our environmental program.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		4 (13%)	15 (48%)	5 (16%)	6 (19%)	1 (4%)

Industry Barrier Findings

The industry barrier findings were similar to the organizational barrier findings. Overall, the APTA Sustainability Signatories surveyed did not strongly identify them as barriers. Respondents did not view regulatory constraints as an inhibitor to meeting environmental goals and 52 percent of survey respondents indicated that there is adequate technical knowledge and expertise to carry-out environmental program requirements. Table 4.2 breaks down each survey question in this category in greater detail.

In the industry barriers category, regulatory constraints, 19 percent of respondents strongly disagreed, and 45 percent of respondents disagreed that federal, state and local regulatory constraints were a hindrance to innovation in relation to their environmental programs. Twenty-two percent of respondents provided a neutral response, while only 13 percent of respondents agreed or strongly agreed that regulatory constraints interfered with environmental innovation.

The majority of respondents to the survey agreed or agreed strongly (52 percent) that there is adequate technical knowledge and expertise to quantify, implement and report on environmental programs. However, 23 percent of respondents provided a neutral response to this question and 7 percent of respondents disagreed that there is adequate technical knowledge and expertise at their organizations for meeting environmental program goals.

Table 4.2 - Industry Barrier Findings						
Category	Questions	Frequencies				
Regulatory Constraints	Regulatory constraints hinder innovation that could lead to meeting environmental program goals.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		6 (19%)	14 (45%)	7 (22%)	3 (10%)	1 (3%)
Insufficient Technical Knowledge and Expertise	Staff at my organization have adequate technical knowledge and expertise to quantify, implement and report on environmental programs and goals.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	2 (7%)	7 (24%)	11 (36%)	11 (36%)

Financial Barrier Findings

Similarly to the organizational and industry barrier categories, financial barriers were identified by the survey respondents as a barrier to meeting environmental program goals at some organizations, but not a majority of them. Twenty-nine percent of respondents agreed or agreed strongly that their organization lacks the funding necessary to support an adequate environmental staff, while 25 percent provided a neutral response. However, 44 percent of respondents disagreed or strongly disagreed that their organization lacked the necessary funds, indicating that they have an adequate environmental staff.

Fifty-one percent of respondents agreed or agreed strongly that their organizations do make adequate capital investments to meet environmental program goals. Thirty-nine percent responded neutrally and only 10 percent identified capital investment as a barrier to meeting their program goals.

Table 4. 3 Financial Barrier Findings						
Category	Questions	Frequencies				
Personnel Costs	At my organization, we lack the necessary funding to support an adequate environmental staff.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		6 (19%)	8 (25%)	8 (25%)	6 (19%)	3 (10%)
Capital Costs	My organization adequately invests in capital projects designed to meet environmental program goals.	Strongly Disagree	Disagree	Neutral	Agree	Agree Strongly
		0 (0%)	3 (10%)	12 (38%)	9 (29%)	7 (22%)

Summary of Findings

Interestingly, none of the barriers identified by the literature were indicated as present in more than 50 percent of the EPMs’ survey responses. In other words, while some EPMs agree that certain barriers are present at their organizations; these barriers are not reported as uniform or widespread across these agencies. But, respondents were asked the demographic survey question, “*What percent do you think your organization is meeting your APTA Sustainability Commitment*”, only 42 percent of survey respondents indicated that they thought they were meeting 76 percent - 100 percent of their APTA Sustainability Commitment; 25 percent thought they were meeting 51 percent - 75 percent, 22 percent thought they were meeting 26 percent - 50 percent and 10 percent of EPMs responding to the survey thought they were only meeting between 0 percent and 25 percent of their APTA Sustainability Commitment. The finding that not all of the Signatories are meeting all of the Sustainability Commitment principles indicates that there may be barriers that were not identified by the literature that are present.

The survey respondents report a high level of organizational and community support. Few responses indicated that industry barriers are a significant problem at the organizations surveyed. Similarly, financial barriers were not reported at a majority of organizations surveyed, however, EPMs report higher barriers regarding staffing environmental programs than funding capital projects related to sustainability.

Chapter 5 – Conclusion

APTA Sustainability Commitment Signatories are having success meeting their environmental programs goals despite previously recognized potential barriers. Organizational, industry, and financial barriers were identified from a literature review of the topic. However, none of these barrier categories were recognized as significant by survey respondents. In part, the success of these agencies' environmental programs could be due to favorable organizational climates for adoption of new processes, community support, and recent funding environmental staff and capital projects from economic stimulus funds.

However, many questions had high neutral response rates. This indicates that while the organizations are doing many things right, EPMs recognize that improvements could be made to achieve more environmental goals. In questions regarding whether an organization has a visible environmental champion, organizational commitment to environmental goals, goal communication, positive employee attitudes, political support, community support, regulatory constraints, and personnel funding, the neutral choice received the highest or the second highest number of responses.

Financially, the investments made for meeting environmental program goals may be higher than expected due to the recent recession and subsequent stimulus packages released by the Federal government. A large portion of stimulus money was apportioned to transit, and more specifically, sustainability in transit. As these stimulus dollars are fully expended, meeting environmental program goals may become more difficult.

Future Research

The fact that these barriers were not as prevalent in the survey population as expected could be an indication that the support provided by APTA for signatories to apply to their sustainability programs is extremely successful. It could also be related to the reality that all of the transit agencies and APTA business members in the study population have already agreed to environmental commitments; many other transit agencies may not share the same agenda as it relates to environmental goals.

In the future, to accurately assess whether or not the barriers identified by the literature review are actually a significant problem at U.S. public transit agencies, the population of this study should also include transit agencies that have not formally committed to a specific environmental programs and instead be conducted on a random sample of U.S. public transit agencies. The research would have greater value in determining what barriers are present, and it would be useful to compare APTA Sustainability Signatories and non-signatory agencies. If no difference is found between APTA Sustainability Signatories and non-members, APTA's role in value change is unclear. On the other hand, if differences are found and identified barriers are reduced at the APTA Sustainability Signatory agencies, then APTA's efficacy is clear.

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Appendix

Appendix 1.1 – Survey Instrument

Environmental Program Goal Barriers

This survey has been sent to all Signatories of the APTA Sustainability Commitment. All survey responses will be kept confidential. Please answer the following questions using the following scale based on your views: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5 or follow specific instructions per question. Thanks for participating!

* Required

1) What APTA Sustainability Signatory Level is your organization? *

- Entry
- Bronze
- Silver
- Gold
- Not Sure

2) What type of organization do you represent? *

- Transit Organization
- APTA Business Member
- Other:

3) Is your organization public or private? *

- Public
- Private
- Other:

4) The leadership at my organization supports our environmental program. *

1 2 3 4 5

Strongly Disagree Strongly Agree

5) There is a visible environmental champion leading the environmental program at my organization. Everyone in my organization recognizes this person. *

1 2 3 4 5

Strongly Disagree Strongly Agree

6) My organization is strongly committed to implementing its stated environmental goals, including those goals in the APTA Sustainability Commitment. *

1 2 3 4 5

Strongly Disagree Strongly Agree

7) My organization's environmental goals are clearly communicated by top management or the environmental champion. *

1 2 3 4 5

Strongly Disagree Strongly Agree

8) The employees at my organization view our environmental program favorably. *

1 2 3 4 5

Strongly Disagree Strongly Agree

9) What percentage of employees do you estimate are aware of your organization's commitment to environmental sustainability? *

- Under 10%
- 11% - 30%
- 31% - 50%
- 51% - 75%
- Over 75%

10) What percentage of employees do you estimate are engaged in developing, implementing and advancing your organization's environmental initiative(s)? *

- Under 10%
- 11% - 30%
- 31% - 50%
- 51% - 75%
- Over 75%

11) Do you believe more employee engagement would increase your organization's ability to meet its environmental goals? *

1 2 3 4 5

Strongly Disagree Strongly Agree

12) There is political support for the environmental program, including from the Board of Directors or other external decision making body. *

1 2 3 4 5

Strongly Disagree Strongly Agree

13) There is external community support for my organization's environmental program. *

1 2 3 4 5

Strongly Disagree Strongly Agree

14) Existing standard operating procedures get in the way of implementing our environmental program. *

1 2 3 4 5

Strongly Disagree Strongly Agree

15) Regulatory constraints hinder innovation that could lead to meeting environmental program goals. *

1 2 3 4 5

Strongly Disagree Strongly Agree

16) Staff at my organization have adequate technical knowledge and expertise to quantify, implement and report on environmental programs and goals. *

1 2 3 4 5

Strongly Disagree Strongly Agree

17) At my organization, we lack the necessary funding to support an adequate environmental staff. *

1 2 3 4 5

Strongly Disagree Strongly Agree

18) My organization adequately invests in capital projects designed to meet environmental program goals. *

1 2 3 4 5

Strongly Disagree Strongly Agree

19) What percent do you think your organization is meeting your APTA Sustainability Commitment? *

- 0% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

20) Are there any other factors that you think contribute to difficulty meeting environmental program goals?

21) Please enter your email address or organization (Optional): Note: Survey results will be kept confidential.

Submit

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