ROLE OF TRANSIT SERVICE PROVIDERS IN LAND DEVELOPMENT

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ABSTRACT

Presently, many transit agencies in the United States are experiencing declining ridership and increasing dependence on government subsidies for operating costs. Encouraging transit agencies to invest in land development is one concept that has been proposed to mitigate the negative effects of decreased ridership and increased dependence on subsidies. This research aims to explore the practice of transit agencies investing and participating in land development.

By means of an online survey among government planning agencies, land developers, and transit agencies, data was collected and analyzed to reveal trends regarding investment in land development, participation in land development, and the influence of government policies on transit's decision to invest. The analysis showed some trends that are consistent with the findings of the literature review. Those trends are the relationships between transit agency participation in land development and policies such as parking, initial funding, communication between stakeholders, recognition of the benefits of involvement, and the availability of land developer expertise. However, no clear trend was identified regarding the relationship between zoning policies and transit agency involvement in land development and the relationship between trip reduction ordinances and transit agency involvement in land development. Attitudes towards and awareness of the practice of transit investing and participating in land development were also identified. This study itself is helpful in identifying barriers that need to be overcome in order for transit agencies to reap the benefits from investing and participating in land development. Future research, perhaps with a larger study, will be able to confirm or deny these trends. A more

detailed feasibility study is definitely proposed for future research, as is a study that takes into account user opinions on the practice of transit investing and participating in land development.

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CHAPTER I INTRODUCTION

1.1. Background

Transit has enjoyed a long history in the United States. Beginning in the mid-1800's, public transit has been an integral part of transportation. From the initial horsedrawn omnibuses to light rail of the present, technology changes have affected the scale and service that transit provides to the American people. The very suburbs that transit companies of the early 1900s sought to create have had a major impact on society. As society changes and car ownership rises, cities become more spread out, and people who do not have access to a car must find alternate means of reaching important destinations. Public transportation is one solution to the mobility problem faced by people who do not drive.

Technology is not the only aspect of the mode that has changed over the years. From the earliest, laissez-faire model of business to the large agencies that, in many cases, cover thier operating costs only with the assistance of significant government subsidies, the financing mechanisms for public transit have also evolved. As the scale of transit grew, and as automobile ownership became more affordable to the average American citizen, transit companies experienced more and more difficulty covering their operating costs. Though car ownership in the United States has been high in the past few decades, a significant portion of the population still depends on

public transit for their mobility. Therefore, transit is an essential mode for many Americans, but increasing government operating subsidies is hardly a sustainable solution.

Many development initiatives, including transit-oriented development, joint development, and smart growth, have aimed to address the problem of decreasing transit ridership from a land development standpoint. While in some cases revenue from ridership can cover operating costs completely, such situations are rare in the United States. Revenue from ridership is not the only way that transit agencies can cover operating costs.Some agencies invest in land development and generate significant profits. While in foreign nations the investment of transit agencies in land development or real estate has been successful, the practice has yet to become widespread in America.

1.2. Problem Statement

Many U.S. transit agencies are in a state of financial dependence on the government to cover thier operating costs. Since transit benefits the community socially, econocmically, and environmentally, it is an essential mode. In some areas of the world, transit agencies invest in land development and enjoy financial independence and stability. This reseach aims to investigate to what extent these investment practices are recognized in the U.S., and what the barriers are that prevent such investment and participation in land development. The three questions that this study will attempt to address are:

1. What is the current state of transit in the United States?
2. What are some current practices involving transit companies in land development?
3. What factors affect transit company investment in land development?

Via a literature review and a survey, these three questions are explore, and the results are presented and interpreted in this thesis.

1.3. Project Overview

This project aims, with an extensive literature review and survey, to identify land development practices and policies regarding land development that support transit use, provide income to transit agencies, and positively impact the community. Experts from around the country are then surveyed to gain insight into the feasibility of such practices in the United States, and both encouraging factors and barriers to transit investment and involvement in land development are determined from the survey results.

CHAPTER II METHODOLOGY

The project consisted of two parts: a thorough literature review of pertinent information on transit service providers' involvement in land development and the development and analysis of results of a survey given to selected interviewees. The literature review was intended to provide a background of transit in the United States and the acknowledged factors that affect the invovlement of transit agencies in land development. The survey is intended to gain expert insight into the impact that the identified factors have on transit agencies' invovlement in land development.

Previous research on the subject is varied. Some, like Hendricks and Goodwill (2002), Dunleavy (2001), and Cervero *et al* (2002) provide helpful summaries of the current state of practice of some of the transit-friendly land development initiatives discussed in Chapter 3 of this report, while others, such as Miller *et al* (1999) and Bailey *et al* (2007), propose models to reflect the relationships between land use patterns and transportation. In some of the literature, such as that of Hendricks and Goodwill (2002) and the Dunleavy (2001), surveys of expert opinion were conducted, but the analysis of such survey results were approached more informally than researchers propose to do in this study. A study similar to this project was conducted by Christopher (2006), but that study focused on bus transit service only. This study will focus on both bus and rail transit. Furthermore, with a wealth of new information on the practice of

transit service providers investing in land development, an updated, comprehensive literature review is needed.

The following detail the methodology behind the research presented in this thesis.

2.1. Literature Review

The first step in the research is to conduct a thorough literature review. Literature selected for inclusion in this research are intended to represent the wide range of available information on the subject of transit service providers' involvement in land development as well as other topics that pertain to the history and current practice of transit in the United States and elsewhere. Scholarly journal articles, books, and some credible websites provided the necessary information for the literature review, which in turn provided crucial information for constructing the survey.

The literature review attempt to address three questions:

1. What is the current state of transit in the United States?
2. What are some current practices involving transit companies in land development?
3. What factors affect transit company investment in land development?

2.2. Survey

The following sections address the design of the questionnaire and the reponses received after the survey had been released.

2.2.A. Survey design

The literature review and the survey design took place concurrently. The aim of the survey is to gain the perspective of American transit officials, land developers, and government officials on the factors that affect the involvement of transit service providers in land development, and to verify literature review findings about the state of practice through statistical anaylysis of the survey results. Researchers became familiar with the current issues and practices of transit companies throughout the world before a survey was designed. The interview questions are designed to obtain relevant stakeholder opinions on the current state of transit, how land development policies actually affect transit ridership and financial health. Additionally, the interview questions are designed to identify the barriers and/or encouraging factors to transit service providers in land development and the general attitudes that affect the extent to which transit companies participate in land development.

Several different survey dissemination methods were considered, and it was decided that an online survey would reach the most people. Furthermore, responses to a well-designed online survey are easily compiled and processed.

From the literature review, researchers realized that some useful information pertaining to land development activities, government subsidization, and attitudes towards transit in new developments should come directly from the developers or the government, as many transit agencies might not be able to answer all of the survey questions pertaining to zoning policies or government subsidies. Therefore, three sets of survey questions were developed: one for transit agencies, one for land developers, and one for government officials. Some of the questions overlap between surveys, but researchers believe this overlap is useful to identify where attitudes of players differ and where communication between players might be weak. The survey was posted on a website, and responses were sent to the researchers for analysis.

A detailed compilation of the questions presented to the transit agencies, land developers, and government employees are provided in the appendix of this thesis. The government planning agency survey had 25 questions, the land developer survey had 23 questions, and the transit agency survey had 47 questions. The topic areas addressed by the surveys are presented in Table 1 on the next page.

Table 1. Topic Areas Covered by Survey

General Area	Questions Address:
Subsidies	Current practices Desired forms of subsidies
Policies	Zoning Parking Trip Reduction Ordinances
Levels of involvement in land development	Current levels Desired levels Factors affecting
Potential for new developments	Spatial potential Financial availablility Demand
Information about transit in the area	Ridership Location Population Mode (rail, bus) Age of agency
Transit Investment in land development	Awareness of the practice Attitude towards the practice Perceived feasibility Attitudes towards development and real estate (no development)

2.2.B. Survey responses

Interviewees were selected and contacted based on their affiliation with either transit companies or with state Departments of Transportation. Other interviewees were selected based on their affiliation with land development companies or government planning agencies in corresponding areas. Additional interviewees were not identified individually. An invitation was sent out to members of the American Society of Civil Engineers Transportation and Development Institute Public Transportation Committee.

The reponses to the surveys numbered 17 in total. Among those 17 respondants, 8 were transit agency representatives, 2 were a land developers, and 7 were government planning agency

representatives. Figure 3 reflects the response rates from each group. While the small sample size does not allow researchers to draw rigorous statistical results, it does identify trends in the data that can later be explored.

The responses reflected agencies from various locations and with varying populations. The areas of the country represented by the responses are given in Figure 1, and the populations represented by the responses are given in Figure 2.

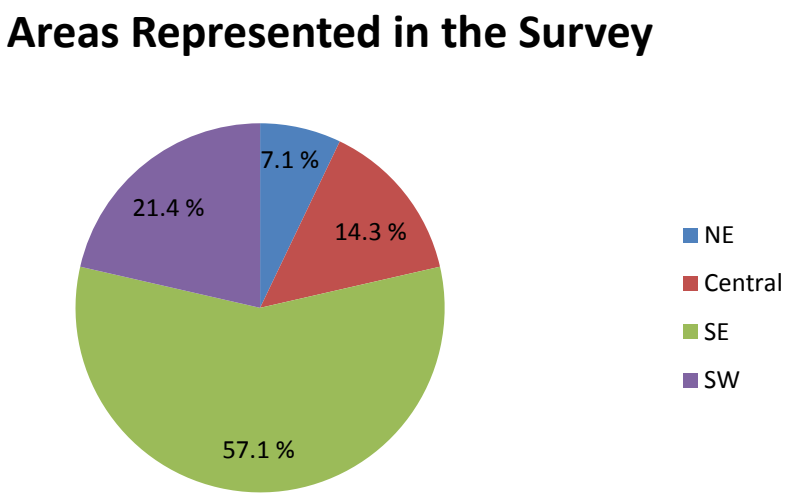

Figure 1. Areas Represented in the Survey

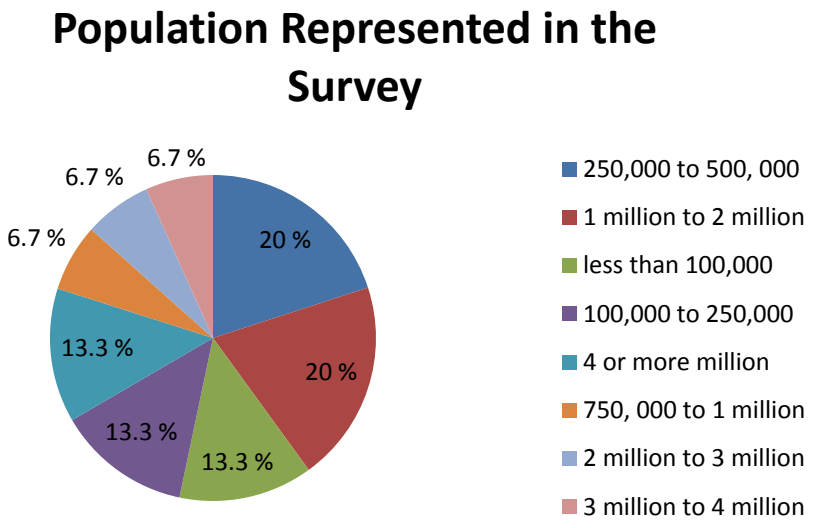

Figure 2. Population Represented in the Survey

80% of the areas surveyed generate a mix of transit-dependent and choice riders. Only 6.7% of the areas surveyed generate only transit-dependent riders, and only 13.3% of the areas surveyed experience transit as a significant portion of the modal split.

Since the surveys were anonymous, the possibility of duplicate demographic data exists. This could occur when a transit agency and a government planning agency from the same city responded to the survey. Theoretically, their answers to the "fact" questions such as the state of ridership and different policy climates should be the same. Therefore, there is a possibility that some of the responses are actually over-represented.

2.3. Analysis Methods

To analyze the data, a simple frequency analysis was first conducted. This first step was designed to alert researchers to any unusual results that might need additional analysis. Cross tabulation was also conducted among some variables to determine if any relationships exist. Sections 3.5 and 4.5 provide the survey results in more detail.

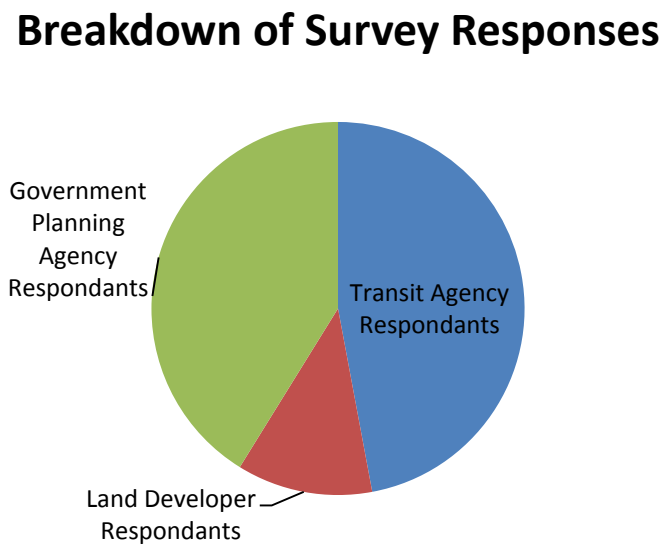

Figure 3. Breakdown of Survey Responses

CHAPTER III TRANSIT IN THE U.S.

In this chapter, the current state of transit in the United States and the historical process by which it came to the current state is presented. Policies that both positively and negatively affect transit agency involvement in land development are also summarized.

3.1. A Brief History

Transit in the United States has a long history. As transit nears its second century in existence in America, its scale and form resemble only minimally the transit that began in America in the 1820's. This section presents a history of how transit in America has evolved and the government involvement that has accompanied that evolution to bring transit to its current state. The relationship between land use and transit has been well established, and leaps in technology have moved transit away from animal power to electricity and gas and have increased the extent of public transit service areas while affecting ridership patterns.

Beginning the 1820's, the main mode of public transit available in the larger urban areas was the horse-drawn Omnibus. The service itself was extremely disorganized with no set schedules or cooperation amongst the different companies or coordination within regions or cities (Cheape, 1980). Yet, despite the operating chaos, demand for public transit was enough to keep these

omnibuses in business until the development of horse railways. Since these enterprises were typically small-scale, transit service providers did not involve themselves much in land development, and there was little or no government regulation of the mode, except those regulations associated with franchising (Cheape, 1980).

The next era in public transit in the US began in the 1840's with the introduction of the horse railways (Foster, 1981). These horse railways coexisted and competed with the omnibuses (Grava, 2003). Like the horse-drawn omnibuses, the horse railway industry consisted mainly of small, private, independent companies with uncoordinated operations. Since the cars ran on rails to ease the physical demand on the horses that pulled them, the cars did at least run on fixed routes. However, the power and strength of the animals that pulled them still limited the extent of the service each horse railway could provide: most railways extended no more than 4 miles (Cheape, 1980). Though they were considered an improvement over omnibuses, since the horse railways were still animal-powered, they were not always reliable as the horses were susceptible to exhaustion and disease. The involvement of horse railway operators was also not on a large-enough scale to impact their involvement in land development. However, there was an increase in government involvement from horse omnibuses to horse railways. Governmental involvement in the horse railways was a little more than that with the omnibuses, because horse railways were technically railroads, which were under the jurisdiction of state authorities. However, other than granting the charter for the railroad, the government typically had little involvement in the running of the horse railways and offered no subsidies (Cheape, 1980).

Information on the profits and ridership of individual horse-drawn omnibus and horse-railways is not readily available, but it can be safely assumed that in the lassiez-faire economic climate of the mid 19th century, the companies who were able to provide the most comfortable and convenient services at a reasonable price were able to generate enough revenue to cover operating costs, and that those who did not manage to cover their operating costs simply failed and were replaces by companies that were able to turn a profit.

Cable cars followed the horse railways in the 1870's, and whilst they were extremely difficult to install and operate, they had advantages. They were on signal-controlled coordinated systems, unlike the previously popular horse-drawn modes of transportation. The travel times users experienced were more predictable, especially in areas with steep grades that horses simply could not handle well (Cheape, 1980; Foster, 1981; Black, 1995). Ridership in city areas was strong, as the cable cars were more reliable and therefore more attractive than previous horse-drawn alternatives. According to Grava (2003), the extent of streetcar track in the United States at the turn of the 20th century was 22,000 miles. This figure was only to grow with time and changing technology. However, this mode was rather capital-intensive, as the cable cars required more expensive infrastructure than did the omnibuses or horse railways (Black, 1995). It was during this time period that the concept of transit agencies having an impact on land development originated, as transit companies realized that they needed to either build their lines to serve new development or create new development (and demand) to ensure ridership. Also during this time period, government interest in regulating the public transportation sector strengthened.

More information is available about the costs and revenues associated with cable cars. Though the operating costs associated with cable cars was considerably less expensive than those associated with feeding, grooming, and otherwise caring for the horses of horse-drawn transit, the fixed costs of installing the cables were so astronomical that to cover the costs, lines had to be located in innercity areas where the dense population would provide increased ridership (Cheape, 1980).

In the mid-1880s, electric streetcars first appeared. Since they were less susceptible to geometric constraints and weather conditions, streetcars powered by electricity were more reliable (Cheape, 1980). The initial infrastructure they required was less expensive to build than that of cable cars, electric streetcars gained great popularity with the public. In fact, during the last decade of the 19th century alone, track mileage increased by nearly 300 percent (Cheape, 1980), and between 1880s and World War I, ridership grew 700 percent (Foster, 1981). This increase in track mileage reflects a phenomenon that was new to the era: that of the migration of middle and upper class families to new suburban areas. Around the turn of the century, the densely populated city centers, which consisted of commercial, residential, and heavy industrial areas all bonded together with slime and pollution, were extremely unpleasant places to live, but middle class workers in particular needed to keep their jobs in the city. The extension of streetcar service to the edges of the city and then later out to the clean and wholesome suburbs made the dream of living in a single-family dwelling with privacy and plenty of green space a reality for many Americans who worked in the city (Muller, 2004). The street railways were the first mode of public transportation to recognize the impact that their involvement in land development could have on both their own finances and urban development patterns, so it was during the time of the

streetcars that the practice of transit companies participating significantly in land development took hold. The suburbs were an attractive housing location, and the city was still the business center, so transit companies capitalized on the demand for their services between the then-outskirts of the cities and the business districts. In some cases, transit lines were even influential in shaping where new development occurred, as developments would likely spring up in areas that had access to a transit line.

Sadly, streetcars reached the pinnacle of their ridership just before World War I, and have been steadily declining since: by 1970 streetcar systems numbered only 9 in the U.S., though there has been some small interest in reviving them in newer forms in more recent years (Grava, 2003).

Since electric streetcars were less expensive to install than cable cars, and since the operating costs were much less than those of previous modes, companies generated significant revenue. As wages were rising and fares were relatively constant, more lower-class people could afford to ride the streetcars regularly (Foster, 1981). Around the turn of the century, though, transit companies saw a decrease in their profits, as the fixed costs that resulted from overexpansion of the infrastructure ate away a larger portion of the profits generated by operations (Cheape, 1980). It should be noted though, that while profits were decreasing, the streetcar companies were in fact still turning their own profits. However, by World War I, those profits were decreasing rapidly: by the 1920's most transit companies' ratios of operating costs to gross income rose by over 25% due to factors such as inflation and higher labor costs (Yago, 1984). Yago (1984) also cites corruption and dishonest bookkeeping within the transit companies themselves as a likely factor for some of the decline in profits.

It is worth noting that the emergence of streetcars marked the beginning of notable government involvement in public transportation. Up to the emergence of the electric streetcars, government involvement in public transit was limited to the granting of franchises and charters, and such involvement will be discussed in section 3.2.

The first experience America had with rapid rail transit within city perimeters dates back to 1867 when New York City became home to the United States' first elevated railway, which was essentially a steam railway operating on tracks elevated above the city to eliminate interference between stops (Grava, 2003). Chicago soon followed suit in 1892 (Grava, 2003; Black, 1995). However, the elevated railways were extremely expensive to build (Muller, 2004). Since elevated railways typically made walking unpleasant for those who used the streets beneath them, operations soon began on the opposite level as tunneling technology made moving the elevated railways to underground tunnels a possibility. The first underground rapid transit steam railway was built in New York in 1904, but the first actual operation of underground rapid transit took the form of streetcars operating in tunnels in Boston in 1897 (Grava, 2003; Black 1995).

Rail rapid transit and electric streetcars were not destined to rule the public transportation realm forever. Technological advances with the automobile greatly affected public transit. After the automobile became popular as a form of transportation in the early 1900's, companies increased the size and capacity of some automobiles to create early motorized buses, which first appeared in their most primitive form in the United States in New York in 1905 (Grava 2003). The first bus-only transit company in the U.S. was the Municipal Auto Bus Service of St. Louis (Grava

2003). Indeed, various researchers present an interesting perspective on this new competitor: automobile companies such as General Motors (GM), in an effort to secure their own profits and eventually increase American dependence on the automobile, decided to influence private companies' decisions to switch to motorized buses (which GM and other automobile manufacturers would provide, of course) through less-than-honest deals and loans for the conversion (Yago, 1984; Grava, 2003; Taylor, 2004), though some historians and researchers disagree with the accusations of corruption. Such underhand dealings also benefitted oil and tire companies as well as bus manufacturers. The questionable business dealings were largely successful, so by the 1950's most of the transit companies in the United States had been motorized: and they were largely bankrupt (Yago, 1984). Since buses had smaller capacities and many people felt that crowded, noisy, slow, and less comfortable bus transit was not a good option, the ridership of bus transit began to drastically decline after World War II (Hendricks and Goodwill, 2002). As more and more transit companies switched to motorized buses, ridership declined and subsidies failed to help transit companies cover their operating costs and turn a profit. As ridership of bus transit declined, agencies reduced or eliminated service to certain areas, which in turn reduced ridership even more, and revenue declined as a result (Grava, 2003).

Ridership has not decreased for metro transit (also known as rapid transit or rail rapid transit) as it has for other modes. In fact, during various parts of the 20th century, ridership seems to actually follow an increasing trend (Grava, 2003). However, factoring in significant population increases, the share of rail rapid transit trips has just barely been holding its own (Grava, 2003), but there is hope from the past trends that ridership can increase in the future.

Ridership for all modes of public transit has been lower than it was before World War II, and some general causes include increased competition from personal automobile, decentralization of cities, decreased financial assistance from the government, and general disorganization on the part of transit companies (Pucher, 2004). Furthermore, Pucher (2004) identifies the areas of the United States where transit ridership is the strongest, with the Mid-Atlantic region having the highest modal share of transit trips at 5.8%, and the next highest region being the Pacific with a 2.2% modal share of transit trips. The same author asserts that the number of passenger trips increased between 1975 and 2001 (Pucher, 2004), though Black (1995) contends that the somewhat small increasing trend in ridership numbers actually started in the early 1970's. This increasing trend in passenger trips might well be a result of an increase in total population or other factors, as Pucher (2004) states that the percentage of total trips people make that are made by transit actually has been following a decreasing trend.

Currently, many modes of transit coexist in the United States. Rail and bus are the two predominant modes, with many areas having some variety of rail or bus system in place. According to the 2011 Public Transportation Fact Book, which is published by the American Public Transit Association, or APTA for short, transit trips in the U.S. numbered 10.4 billion in 2009, a number which is higher than the total number of trips taken in 1956 (APTA, 2011). However, such service comes at a price: transit operating costs were $37.2 billion 2008 (APTA, 2011). The same Public Transportation Fact Book acknowledges that government operating subsidies from the lower levels of government covered 56% of the operating costs of US transit agencies in 2008, while 37% of those operating costs were covered by revenues from fares.

Basically, though the number of transit trips is at an improved level from 1956, the revenue generated by those trips is not enough to ensure the financial stability of many transit agencies.

3.2. Government Involvement

Government involvement in public transportation has been increasing steadily since the first forms of transit appeared in the U.S. in the 1820's. The increase has accompanied a decrease in the ability of many transit agencies to cover their operating costs.

The emergence of streetcars marked the beginning of notable government involvement in public transportation. In an effort in the late 1800's to decrease the power of transit companies, local governments restricted some of the operations of the transit companies, such as limiting what equipment could be used on the streetcars and requiring street maintenance, but such involvement only prevented new companies from entering the arena and competing with existing companies (Yago, 1984). The result was a call for public ownership of transportation, but the call was answered only with increased regulations from state governments as the second decade of the 1900's progressed (Yago, 1984).

In the years leading up to World War I, beginning a trend that has continued to the present, the government first began to subsidize electric street railways. However, the subsidies were to be used only for the construction of new infrastructure and not for covering operating or maintenance costs (Yago, 1984). Other forms of government policies also affected public transit

finances and ridership between World War I and World War II. The United States government began to offer subsidies for highway construction during this period, and other governmental measures such as zoning rules that promoted low-density development and parking regulations aimed to provide plenty of parking spaces for shops and businesses encouraged the use of the automobile above public transportation (Yago, 1984).

Financial involvement by various levels of government in transit service provision began to intensify after World War II. By the end of the 1950's, state government involvement in transit ended when the federal government prohibited state government from forcing transit companies to provide services they were unable to support. But by the mid-1960's, the federal government began to provide financial assistance to public transit companies to cover operating costs, a practice which is deeply rooted today, over 45 years later (Mistretta and Gregg, 2001). Peoples *et al* (2008) identifies political issues as one reason that a shift from federal operating subsidies back to operating subsidies funded by state and local regions occurred in the 1980's. The same study also points out that similar federal policies in the 1980's prohibited federal funding to be used for transit agencies that had not been privatized. Operating subsidies were necessary, as a third of all US transit companies were bankrupt in 1981 (Grava, 2003).

The present situation is little better. The total amount of subsidies given to transit companies in 2000 was 22.8 billion dollars. However, Taylor (2004) notes that the subsidies are typically geared more towards capital improvements and less towards the covering of operating costs. Furthermore, the author cited that almost 35% of operating revenues in 2001 were subsidies from local and regional governments, while 21.8% of operating revenues came from subsidies given

by states, and the federal government contributed a mere 4.8% of operating revenues (Taylor, 2004). Statistics from the American Public Transportation Fact Book (APTA, 2011) cite that in 2008, 56% of operating costs were covered by local, state, and regional government subsidies, and only 8% of operating costs were covered by the federal government. Other venues of government involvement include regulations for things such as emissions and safety.

3.3. Transit and Land Use

Transit ridership is not strong currently, and likewise the financial stability of many transit companies is somewhat tenuous. Subsidies might be an answer to the financial insecurity faced by many agencies, but with the rising costs of operation today, it is unlikely that subsidies alone are a sustainable solution. The participation of transit companies in developing the built environment is one way to encourage ridership. The following sections examine the relationship between transit and land development and present some initiatives that are currently in use in the United States. This section also briefly addresses the benefits that transit investment in land development can have on the community, on the environment, and on the transit agency itself.

3.3.A. Relationship between transit and land use

The relationship between transit and land use is well recognized. The consensus is that mixed land use in areas that are densely populated is the most conducive to transit usage. The theory is

that people will be less likely to drive if they can access desirable destinations conveniently. Public transportation and mixed land use are two ways to maintain a population's mobility while reducing the demand for automobile use.

Public transit and mixed land use are intertwined. If people are encouraged by the built environment to avoid making car trips, they should be provided easy pedestrian, cycling, or transit access to the places essential to their daily life. In other words, lower car usage tends to occur in areas that are densely developed (Dunphy and Fisher, 1996; Schimek, 1996 a, b; Cervero and Kockelman, 1997) with mixed land use (Loo *et al*, 2010; Hondorp, 2002). Loo *et al* (2010) further emphasizes that the coexistence of high density developments and mixed land use might be essential to promote transit use. By developing land to be high-density *and* of mixed land use to discourage automobile use and encourage alternative forms of mobility such as transit, development and land use can support transit usage. Such developments tend to occur in places where people, including those who either cannot or choose not to drive, can access them. Basically, under the correct circumstances, public transit and dense, mixed land use can have a symbiotic relationship, with one encouraging the other.

The relationship between land use and transit can be measured economically. The impact that public transit has on the values of the surrounding land are cited to be in the range of 5 – 10% for residential developments and 10 – 30% for commercial developments (Agence Francaise de Development and the French Ministry of Ecology, Energy, Sustainable Development, and the Sea, 2009). Papa *et al* (2008) similarly asserts that for the city of Naples, at least, the amount of change in land values is dependent on the type of land use, with differing land value impacts for

commercial and residential uses. The impact can be even larger than 30%, as Priemus and Konings (2001) (citing Cervero, 1999) asserts was the case in Tokyo, Japan, when land values along a new rail line rose by 57% after the land was developed. Similar examples of land value increases near transit stations include the case of Helsinki, Sweden (Agence Francaise de Development and the French Ministry of Ecology, Energy, Sustainable Development, and the Sea, 2009) and Naples, Italy (Papa, Pagliara, and Bertolini, 2008).

Since public transit and land use are so interconnected, it makes sense that transit service providers might involve themselves in land development and that land developers might involve themselves in transit. This paper examines one aspect of the complicated relationship between the two: that of transit companies's involvement in land development. There are many initiatives and practices that currently include transit agencies in the land development process. The next sections outline some of those initiatives and the benefits associated with them.

3.3.B. Initiatives

With transit in the precarious state it is in today, the practice of transit companies investing in land development is not widespread. However, the practice is not altogether dead. Three of the more recognized forms of transit companies' investment in land development are transit-oriented development (TOD), joint development (JD), and smart growth. Since all three of the initiatives provided in this section mention high-density and mixed land use, it is important to note that here mixed land use does not imply residences among heavy industry as in the cities in the early

1900's, and high-density does not mean overcrowding. The mix of land uses referred to here implies a blend of residences, buinesses, retail shops, and restaurants that will provide residents with business, shopping, and dining options while maintaining pleasant living conditions, and the high-densities referred to in this section typically means more compact development, such as houses on small lots, townhouses, or apartments.

TOD essentially focuses on the development of land around an existing transit station or hub. Lai (2008) defines "land around" as the areas, whether public or private, within walking distance of a station, regardless of whether the land is publicly or privately owned. An area can be termed a "transit-oriented development" if it fits one of the many definitions on the market today. Bernick and Cervero (1996) defines the transit village, which would be the same thing as a TOD in the modern vernacular, as "a compact, mixed-use community, centered around the transit station that, by design, invites residents, workers, and shoppers to driver their cars less and ride mass transit more". Cervero (2004) later gives a broader definition for transit-oriented as an area that is "dense, pedestrian-friendly, and transit-supportive". Hondorp (2002) defines a TOD as a development that "[encourages] the use of public transit by siting residential, commerical, or office uses –or a combination of all three- close to a transit node." Notice that all three definitions address the land use around the station and the encouragment of transit use. There is no quantitative definition of TOD in terms of size, population density, or the mixture of land use, because the size and location of the city in question can cause the density and other factors to vary significantly.

Transit-oriented development has had a long history. Though many do not realize it, transit-oriented development has been in existence for over a century. At the turn of the 20th century, as rail lines became more and more popular, people began developing suburban areas, simply because the rail provided convenient access to the urban centers that people were so desperately trying to escape for their private residences. In late 1800's and early 1900's, the cities in the United States, particularly those that had a heavy industrial influence, were perfect examples of the wrong kind of high-density, mixed land use: private residences were intermixed with factories and slaughterhouses, and frequently due to the unavailability of space, many people resided with an unhealthy number of people in their dwelling. Many such people desired to move to a stand-alone house in a serene country neighborhood while still keeping a job in the polluted and unpleasant city center. Transit service to the suburbs made this desire a reality. Basically, the early suburbs of American can be considered the first transit-oriented developments in America (Foster, 1981; Bernick and Cervero, 1996; Hondorp, 2002; Hendricks and Goodwill, 2002). Suburban development could only occur in areas that were well-served by a transit system. Providing the service was profitable to the transit companies not just because of the increase in ridership, but also because the transit companies could purchase land to build railways, and then sell any extra land later to turn a profit even if the actual transit service itself was not profitable (Foster, 1981). As suburbanization became more widespread across the United States, and as the automobile became more available to the average citizen, transit use declined. Indeed, the suburbs that transit created in the early 1900s contributed to the decline of transit over the next century. As people moved to the suburbs, the land use and population became less dense, and transit use in urban areas declined as people were able to buy automobiles ..

Only recently, faced with financial failure, has the concept of rejuvenating and redeveloping the areas around transit been reconsidered. In the 1990's in particular, initiatives such as the "New Starts" funding program encouraged local governments to take action to make transit use easier and more attractive in their cities, while federal policies became more transit-friendly with the Intermodal Surface Transportation Efficiency Act and the Transportation Equity Act for the 21st Century (Hendricks and Goodwill, 2002).

A 2004 study done by Cervero and associates (Cervero *et al*, 2004) identifies more than 100 TOD developments in different states within the US. Further research from selected web references updated the study's numbers of existing and planned TODs within those states, and the results are given in Table 2. Sources for Table 2 are presented separately in the reference section of this thesis. Using the Center for Transit-Oriented Development TOD database, the total number of transit existing transit stations in the specified states was found to be 3014. Within the selected states, the percentage of stations that are recognized TOD's is around 6%.

Table 2. Estimates of Transit-Oriented Developments (Existing and Planned) by State*

State	Rail and Rail/Bus TODs	Bus TODs	Total TODs	Date
California	50	1	51	-
Colorado	5			2006
Delaware		1		2004
Florida	2	1		2004
Georgia	7			2008
Illinois	6	1		2012
Kentucky	1			2004
Maryland	10			2011
Missouri	1			2004
New Jersey	24		24	2012
New York	5			2004
North Carolina		1		2004
Ohio	3	1		2007
Oregon	11			2007
South Carolina		1		2004
Texas	6			2004
Utah	26			2012
Washington	3	3		2004
Washington, DC	13			2004

*Sources for Table 2 presented separately in the references section

Belzer and Autler (2002) provides a 6-criterion framework for assessing the success of a TOD: financial returns on investments, location efficiency, value recapture, livability, choice, and efficient regional land use patterns. The first two criterion make sense: becoming involved in a TOD project that does not cover the cost of investment in the foreseeable future is not a financially sound move for a transit agency or a developer, and a location and design for a TOD that does not either incorporate transit or provide relatively simple, non-motorized ways to access transit is hardly a TOD at all (Belzer and Autler, 2002). The third, fourth, and fifth criterion pertain to homebuyers: people will look for properties that will allow them to save money while still having lots of choices for locations and travel modes that yield a good quality of life (Belzer and Autler, 2002). The sixth criterion applies mostly to planners who are

concerned with the big-picture of the region's development. A successful TOD will meet some if not all of these criterion.

Unfortunately, not all TOD developments are unquestionable successes. For example, as of 2004, two TOD's (Center Commons, and The Round,) in Portland, Oregon experienced only limited success. The developers for the Center Common experienced financial woes over their inability to sell some of the housing units in the development, and the first developer for The Round actually went bankrupt on account of unxpected costs associated with the project.These projects did achieve higher density and mixed land use that is transit-supportive, as is discussed in section 3.3.A, but they were not successful in terms of construction or leasing out the newly developed land. Other TODs in Portland enjoyed some success. The Pearl District was successful as of 2004(Cervero *et al*, 2004), experiencing notable ridership from development around its streetcar line (Cervero *et al*, 2004). A Reconnecting America report (Thorne-Lyman *et al*, 2011) identifies key issues facing the Portland, Oregon region in its endeavors to build TODs. Among those issues, limited funding sources is listed first. On the other hand, the report also addresses the risk associated with TOD projects as a limiting financial factor in developments. Investments for TODs might be difficult to obtain if TODs in the area have a record of being financially unviable. Transit-oriented development can be transit-supportive only if the project is successfully constructed and the housing and business units are sold or leased. Otherwise,as two of the Portland, Oregon TODs demonstrate, at least one party in the development process will likely experience financial difficulty.

The distinction between joint development and transit-oriented development is sometimes blurred. For example, Forkenbrock *et al*. (1990) define joint development as "land development near an existing transit facility, taking advantage of value created by the concentration of passengers." In the words of Beltran *et al* (1986) "joint development refers to the planning and implementation of an income producing real estate development which is adjacent to or physcially reltated to an existing or proposed public transportation facility." Cervero *et al* (2002) explains that more specific definitions for joint developments address the "fiscal, institutional, or legal dimensions" of the partnership between the public transit agency and the private developer and therefore distinguish JDs from TODs. With respect to the financial dimensions of a joint development, the two groups that the Cervero *et al* (2002) identifies are joint developments that engage in revenue-sharing (i.e., arrangements to increase the revenue of the transit agency) or joint developments that engage in cost-sharing (i.e., arrangements designed to lessen the costs the agency would face as a result of the development) with the private developers.

More distinctions between the TODs and JDs are presented by Cervero *et al* (2002): TODs are typically of a larger scale than JDs. Lai (2008) draws the distinction that while TODs can be built on land owned by a variety of people, JDs are usually built on public land, usually directly on top of transit stations. Furthermore, frequently in TODs a public agency will coordinate the project, whereas with JDs, a public-private partnership is formed.

Cervero *et al* (2004) claims that from the early 1990's, the number of joint developments surpassed 117 in the U.S. As of 2004, Bethesda Metro Center was the most financially successful joint development project in the U.S (Cervero *et al*, 2004). While rail travel is the most

predominant mode of travel for joint developments as it is for transit-oriented development, bus joint developments make up a higher percentage of the total joint developments than bus TODs comprise of the total TODs in the United States (Cervero *et al*, 2004).

Smart growth is a similar development concept to promote transit use amongst other things, but the arguement for it has a unique underlying premise than the arguements of economics and social benefits presented to support transit-oriented and joint developments. Smart growth, as defined by the Surface Transportation Policy Project and the National Resources Defense Council, is development that is "compact, walkable, and transit accessible"(Miller and Hoel, 2002). This definition is rather similar to those of transit-oriented development and joint development. However, transit smart growth definitions more typically address environmental impacts as well: Miller and Hoel (2002) cites the Environmental Protection Agency and others as identifying smart growth as "an approach to (metropolitan) development that serves the economy, community, and environment." Of course, the converse is that many of the principles addressed by transit-oriented and joint development also can have a positive effect on the environment by reducing emissions and urban sprawl, but their definitions rarely state a specific environmental preservation goal. Smart growth seems to be more a code by which urban growth can occur in ways that are healthy for the community and its residents and less an identifiable project like many joint developments.

Transit-oriented development, joint development, and smart growth are just three of the more common development types that aim to create more liveable communities. All three recognize the role that transit plays in that goal. When transit considerations are included in development,

the benefits both to the transit agencies themselves and to the community can be many and varied.Of course, any initiative that reduces the amount of car trips a person makes will have a positive impact on air quality. Similarly, initiatives that are aimed at densifying the built environment likely will have a positive impact on transit ridership, as discussed in section 3.3.A. As transit ridership goes up, so will transit agency profits. Furthermore, the creation of communities that are well-rounded, with a mix of land uses and a built environment calculated to make daily life easy and pleasant without car use, will improve the overall quality of life of community members.

3.4. Influential Policies and Practices

The involvement of transit companies in land development offers a solution to the financial problems and the decline of transit usage over the years. But there are many policies and practices that affect the success of transit companies' involvement in land development. Such policies and practices can come in many sizes and shapes and can originate from different levels of government. Banister (2005) presents three different levels of government that generate policies that pertain to transit and land development: 1) National level policies that influence development locations; 2) Regional level policies that influencedevelopment types and land use; and 3) City level plicies that influence land use mixing, density, and layout. Some current policies and practices in the US create an encouraging environment for transit involvement in land development. Other policies impact transit service provider involvement in a less positive way. Banister (2005) proposes a package of policies at different levels of government to best

encourage sustainable development and transit use. Some practices, which are not mandated by law, can have a significant impact on transit participation in land development.

Currently there are many programs on the regional, state, and local level throughout the US that encourage the implementation of TODs and joint developments. According to Reconnecting America's 2010 Inventory of State, Regional, and Local Programs that Fund Transit-Oriented Development Plans and Projects (Anderson and Forbes, 2011), the programs that promote TOD activities can be divided into 5 categories: federal policy, authorizing legislation, design guidelines, local zoning, and direct funding and financial incentives.

The following sections will provide in-depth discussions regarding policies that affect the ease with which transit companies can develop land to meet the goal of turning a profit from ridership.

3.4.A. Subsidies and financing

The policy category that typically receives the most attention and to which the most success is credited is the direct funding and financial incentives. Anderson and Forbes (2011) notes that the direct funding category can be further divided into three groups: funding dedicated to planning the TOD, funding to buy the land the TOD will use, and funding to actually construct the TOD. Table 3numerates the state, regional, and local TOD and JD programs and initiatives identified by Anderson and Forbes (2011) by the types of funding they received. As is apparent from Table 3, most of the TOD and JD financial programs are in states along either coast where the

population is greatest. Of course, this might be the reason that the concentration of TODs is greater along the coastal states than in the Midwest and interior states. There were also no programs identified by Anderson and Forbes (2011) that provide funding from the local level for the planning of TODs and JDs. This lack of local funding for planning for TODs actually makes sense, since a TOD or JD cannot be isolated: successful TODs and JDs are interconnected throughout the region by the transit service like the string-of-pearls analogy presented by Deakin and Cervero (2008). Therefore, it makes sense that TOD or JD planning would be funded from the regional or state level and not the local level. In addition to the three common funding types, financial rewards are in some cases offered to transit agencies that invest in land development. An example would be the transit companies who recieve extra funding under the San Francisco Metropolitan Transportation Commission's Housing Incentive Program for investing in or building housing within a quarter of a mile of transit stations (U.S. Department of Transportation Federal Transit Administration, and U.S. Department of Housing and Urban Development, 2008).

Table 3. Types of Funding Initiatives (Anderson and Forbes, 2011)

Property Acquisition		
State	Regional	Local
Maryland Minnesota	California Georgia Oregon Texas Washington	Colorado Minnesota North Carolina Washington
Planning		
State	Regional	Local
California Connecticut Maryland Massachusetts New Jersey Pennsylvania	California Colorado District of Colombia Georgia Illinois New York Pennsylvania Texas Washington	None
Implementation		
State	Regional	Local
California Connecticut Illinois Maryland Massachusetts Minnesota New Jersey Oregon	California Colorado District of Colombia Oregon Texas Washington	Arizona California Minnesota Oregon Washington

Tscharaktschiew and Hirte (2012) identify the kinds of transportation subsidies that have the most positive impact on society: their studies show that subsidization of public transit usage by reducing the taxes users pay on transit fares has great benefit to society out of a selection of other forms of subsidies to transportation, although there is some debate about the relative amount of benefits that society actually derives from the subsidization. However, Tscharaktschiew and Hirte (2012) identify reduced emissions and a general increase in aggregate welfare to society as a benefit of subsidies to public transportation. Aggregated welfare in a general sense typically encompasses other benefits besides the environmental: such benefits may include reduced costs to society from congestion and stress from waiting in traffic, among other things.

Another kind of financial initiative can also impact the success of transit-friendly developments. All the financial aid for construction of TODs in the world will not create successful developments if homebuyers, businesses, and retailers simply refuse to rent or lease land in the developments. One way to encourage these homebuyers to think outside the box and consider moving away from the suburbs and sprawl is to offer location-efficient mortgages to those who would relocate to areas that are more densely populated and closer to transit (Hendricks and Goodwill, 2002). In this way, some extra demand for transit could be generated. Transit companies would then have a stronger incentive to participate in land development.

Christopher (2006) mentions funding strategies as way to encourage the inclusion of transit considerations in land development. She cites developer funding (developers paying the extra expense of accommodating transit to aviod paying impact fees), muncipal funding (cities finding funds to help pay for the inclusion of transit in development), separate funding sources for planning activities, and tax increment financing as four ways of land developers, government planning agencies, and transit agencies financially cooperating to create successful transit presence in new developments.

Furthermore, the goal of most developers is to make a profit, and some TOD projects involve higher risks than do normal projects, and thus banks may be less likely to offer the developers the necessary loans (Hendricks and Goodwill, 2002). Cervero *et al* (2002) cites methods such as sliding-scale impact fees and a reduction in other fees to ease the burden on land developers who undertake TOD projects and hopefully make these projects more attractive to developers in the

future. Tax abatement is another financial incentive for developers to undertake development projects, as is "resourceful and opportunistic" funding strategies (Cervero *et al*, 2002).

These programs, initiatives, and funding strategies are ways to lessen the cost of transit participation in land development on all three parties involved. Since a development must result from the collaboration between government planning agencies, land developers, and the transit agency, funding received by any of the agencies for transit-friendly development will encourage transit participation in land development.

3.4.B. Zoning

Funding policies are not the only policies that affect the success of transit service providers' participation in land development. Another important category of policy that impacts transit-friendly development is zoning. Christopher (2006) cites regulatory tools as being influential on bus transit-oriented and joint developments, and perhaps the most common regulatory tool that comes to mind regarding transit and land development is zoning.

Zoning policies can have a negative effect on transit involvement in land development. Hendricks and Goodwill (2002) considers government regulations, particularly zoning policies that encourage the low-density sprawl that spawns automobile usage, to be the biggest regulatory obstacle to transit-oriented and joint developments. Furthermore, some prime land for TOD or JD use may be in or near residential zones, and local regulations typically forbid the high-density, mixed land use that encourages the use of public transportation without rezoning

(Cervero, 2004). Zoning that does not allow the kind of transit-supportive development that transit agencies would like to pursue would make the development process difficult for transit agencies and therefore deter transit participation in land development.

However, zoning policies may be necesary to encourage transit-friendly development in some areasif they can accommodate or even encourage mixed use and high density development, at least around stations (Cervero *et al*, 2002; Morris, 2002). Morris (2002) identifies a few areas in the United States that have zoning policies supportive of transit use. One such area is Montgomery County, Maryland, where zoning policies are not necessarily much different from the typical, transit-hostile zoning policies of many suburban areas of the United States, but the zones themselves are significantly smaller than they are in other areas. This allows for an elegant compromise between mixed land use and the single-family dwelling neighborhoods that are in such high demand. That neighborhood structure still exists, but on a smaller scale, and since the zones are so much smaller, land use naturally mixes.Another example would be Arlintgon County, Viriginia. In this area, transit-friendly zoning that encourages mixed land use and higher densities is in effect within a certain distance of transit stations, and basically the mixed-use zones are oriented around transit stations. Such policies make involvement in land development easier for transit companies, as the companies can develop to encourage the use of their service without going through the added trouble of changing exisiting zoning policies, the ease of which varies from region to region.

Atkinson-Palombo and Kuby (2011) explores the Phoenix, Arizona system of overlay zoning: some zones within the city and around the suburbs have zones within zones, so to speak, where

some of the regulations are modified to accommodate transit-oriented development or joint development in the future. One interesting finding of the study is that despite the overlay zoning, the type of businesses and developments already in the area affect the success of the TOD that is introduced to the area. Furthermore, it is found in the same study that the types of developments that occur after the implementation of TODs or JDs depend on the land use before the TODs or JDs are constructed. Therefore, while changes to zoning regulations and structures helped the success of TODs and JDs in some areas, such changes of regulation do not present a solution to the problem of implementation of TODs or JDs for all areas.

3.4.C. Parking

It is recognized that parking policies can influence development. Banister (2005) notes that parking policies influence modal choice in the short term and location for development in the long term. Requiring minimum parking is another regulation that weakens the motivation for transit-friendly development: people who have plenty of parking options and are already set in the pro-automobile mindset of the present will be less likely to take transit. Some parking policies can be transit-friendly. Pucher (2004) notes that Canadian and European parking regulations set maximum numbers of parking spaces for new buildings instead of the minimum numbers set by cities in the United States. Basically, free and plenteous parking around a transit-friendly development will entice people to drive to the development, thus making the entire development less effective at generating ridership. If a development is not likely to generate ridership or promote transit interests, it makes sense that a transit agency would choose not to invest or participate in it.

3.4.D. Trip reduction ordinances

Another way of promoting TODs and transit use is the implementation of trip reduction ordinances (Hendricks and Goodwill, 2002). Trip reduction ordinances encourage citizens and businesses to decrease the number of trips made by private car. Transit is a perfect way for these ordinances to be met. Trip reduction ordinances, also encourage the ideal of transit participation in land development, since transit-friendly developments are a way for residences and businesses to meet these ordinances, and the demand for the development can be strong. As the local community generates demand, transit companies might be encouraged to participate in development to meet the demand. Of course, a byproduct of meeting this demand is an increase in ridership. This increase in ridership that results from trip reduction ordinances can be a motivation for transit to participate in development.

3.4.E. Transit agency and land developer commitment

Many transit agencies do not have the personnel or desire to become involved in land development, which they do not view as relevant to their own operations (Christopher, 2006; Cervero *et al*, 2002). Therefore, many agencies do not actively seek to participate in land development. Cervero *et al* (2004) note that most companies do participate minimally in developments by merely providing guidelines and suggesting regulations to local government and planning agencies, but such guidelines might lack the power or teeth to actually influence the developers' decision to include transit from the start of a project. Transit participation in land

development may be affected by a developer's commitment to working with transit agencies to ensure that transit needs are reflected in new developments. However, this commitment to including transit interests in new projects is not always present. Perhaps one of the biggest obstacles to the growth of TODs and joint developments in the U.S. is the ignorance of the developers to the usefulness and potential benefits that public transportation can offer society: since public transportation is not popular in some areas, most developers currently do not consider it in their plans, and as a result a dilemma arises with public transportation being unable to grow and to become a more weighty factor in the plans of the land developers (Christopher, 2006). Hendricks and Goodwill (2002) suggests measures to make the idea of TODs and JDs more palatable to not only land developers but also potential home buyers: perhaps one of the most profound ways they identified in their report to promote to potential home buyers in particular the idea of TODs and JDs is to encourage the preservation in TODs and JDs the suburban qualities such as open spaces and plenty of sunlight that attract Americans to the suburbs in the first place. If Americans developed the suburbs in an attempt to leave the noisy and overcrowded cities, a great many of them will avoid a return to similar conditions, even if it means forgoing their access to public transit.

Transit participation in land development is a collaborative effort between transit agencies, government planning agencies, and land developers, and thus a lack of commitment on the part of one agency will discourage participation from the others.

3.4.F. Connectivity between developments

Also, the amount of TODs and JDs near a city can dictate the success of the developments. A few, widely-scattered TODs will not function as well or generate much demand for a city's transit: TODs must connect easily with each other and with urban centers for the development to be successful. Deakin and Cervero (2008) likens a successful group of TODs to a strand of pearls in a necklace. It might be attractive to the public to have nice neighborhoods and shopping and business areas near a transit station, but if the transit station does not connect to other transit stations that are near areas where people might shop, work, or live, the development will not generate demand for the transit service. Indeed, the profits from land lease and sales might be the saving grace for the transit company in such a situation, but it would ultimately not advance the larger-picture goal of livable and sustainable communities resulting from increased transit ridership. Transit agency participation in land development will be encouraged if connectivity between developments ensures ridership and creates the potential for future developments.

3.4.G. Communication

Communication between transit agencies, government agencies, and land developers is a crucial practice for development that is transit-freindly to occur. Doubtless there is a wide range of communication levels amongst these three groups in reality, but it can be safely assumed that the developments that are most transit-friendly are those which are built on strong working relationships between agencies. Communication between agencies is a major aspect of commitment to a project. The agencies that are committed to making a development transit-

friendly will do what is necessary, including communicating with other agencies, to ensure success. Without commitment and communication, participation in land development by transit agencies will be difficult and an unattractive investment of time and money.

3.5. Survey Results

One of the purposes of this study is to identify current practices and trends regarding the policies and practices that pertain to transit use and land development that are presented in section 3.4. The survey responses, as outlined in section 2.2.B., give interesting insight into the current state of transit in the United States and the policies that support or discourage the initiatives that involve transit service providers in land development. The provision of subsidies, communication levels, transit agency and land developer commitment, zoning, parking, and the applicability of trip reduction ordinances are the variables examined in this section to gain a better picture into what policies are common in the surveyed areas. Frequency distributions on selected variables offer valuable insight into the current policies that affect transit-friendly development in the United States.

3.5.A. Recognized benefits of transit involvement to the community

From a transit agency's perspective, the biggest benefit to the community that results from transit agencies' participation in land development is an increase in transit ridership, according to 50%

(4 responses) of interviewees. However, 37% (3 responses) felt that increased economic activity was the biggest benefit that transit company participation in land development could have on the community. Basically, this shows that the two major benefits the community could experience from the participation of transit agencies in land development are increased ridership and increased economic activity. From a government planning agency perspective, the most commonly recognized benefits to the community from transit investment in land development are reduced congestion (42.9%, or 3 responses), increased economic activity (28.6%, or 2 responses), and increased transit ridership (28.6%, or 2 responses).

This difference in perceived benefits makes sense, as government planning agencies generally think on a broader, community-wide scale than perhaps transit agencies usually think. From these results, one can conclude that transit agencies' motivation to invest in land development might be profit-oriented, but their investment can result in many community-wide benefits as well.

The recognition of the benefits to the community and to the transit agencies themselves that result from the participation of transit agencies in land development might encourage transit agencies to actively involve themselves in new development opportunities.

3.5.B. Communication levels amongst agencies

All levels of communication were represented among survey responders. The most frequent level of communication between government planning agencies and transit agencies is that of strong

communication at frequent intervals (26.7%, or 4 responses). The second most common level of communication is that of moderate communication at frequent intervals (20%, or 3 responses). This leads researchers to conclude that it is common for transit agencies and government planning agencies to communicate frequently and at the very least, moderately. Communication between government planning agencies and transit agencies in the areas surveyed appears to be generally favorable to transit participation in land development.

3.5.C. Subsidies and financing

Transit agencies in the areas surveyed mostly (33.3% of agencies) cover 20-40% of their operating costs with subsidies. The second most common percentage of operating costs that subsidies covered in the surveyed areas is 0-20% (26.7%), and a mere 6.7% covered 40-60% of their operating costs with government subsidies. Of the agencies in the areas surveyed, 42.9% (6 responses) receive grants for transit-oriented development activities, 71.4% (10 responses) receive operating subsidies, and 64.3% (9 responses) receive subsidies for capital improvements. In addition, 7.1% (1 response) do not receive any subsidies, and 7.1% (1 response) are unable to answer questions about subsidies. This shows that a significant amount of the transit agencies surveyed have access to government funding for their participation in land development.

3.5.E. Zoning

The most common (66.7%, or 10 responses) zoning climate among the agencies surveyed allows dense, mixed use developments in some, but not all areas. It is notable that only 13.3% (2

responses) of the agencies surveyed claim that the zoning policies in their area encourage dense, mixed use development in all areas.

Of the agencies that are aware of their areas' policies on zoning changes, about half (6 responses) claim that changes to zoning policies can be made only with great difficulty, and the other half claim that changes to zoning policies can be made with moderate effort.

Basically, the areas surveyed seem to be areas with some dense, mixed-use development, but they are divided on how easily changes can be made to the zoning policies in their area. In a way, the fact that dense, mixed land use is allowed only in some areas in the majority of cases might explain the mediocre ridership that many agencies experience, because the built environment is not conducive to transit use in all parts of a city, so the ridership generated by one neighborhood might not have transit-supportive destination options. This might make transit agencies less willing to participate in transit-friendly development, as previously discussed.

3.5.F. Parking

The most common state of parking among the areas surveyed is that of plenty of free parking (33.3%, or 5 responses). The second most common state is that of plenty of paid parking (20%, or 3 responses). The remaining 46.7% (7 responses) have limited or very little parking, free or paid. This indicates that in the areas surveyed, parking availability is not conducive to transit use. The presence of plenty of free parking undoubtedly affects ridership, as many will choose their automobile over transit when parking is convenient to their destination and free. It can also affect

a transit agency's decision to invest in land development, as the positive ridership gains resulting from the transit-supportive developments in which many agencies would invest and participate can be undermined by a plenteous supply of parking.

3.5.G. Trip reduction ordinances

66.7% (10 responses) of the areas surveyed are not subject to trip reduction ordinances, and only 13.3% (2 responses) are. The remaining 20% (3 responses) are unable to answer the question. Apparently trip reduction ordinances are not very common in the areas surveyed. Since trip reduction ordinances can be viewed as an encouragement from local government for citizens to use transit, in areas where they are not enforced, the ties between local government and transit agencies may not be strong. Thus, participation in land development might be more difficult for transit agencies. Furthermore, the demand for transit-friendly development may not be enough without trip reduction ordinances to makes investing or participating in those kinds of development attractive to transit agencies.

CHAPTER IV INVOLVING TRANSIT SERVICE PROVIDERS IN LAND DEVELOPMENT

There can be no doubt that at present transit is in a less-than-optimal state. In some areas, new initiatives such as transit-oriented development, joint development, and smart growth are currently in practice, but those initiatives are not widely practiced. For the agencies that do invest or are involved in land development, some policies and attitudes affect the ease and succes of the projects they undertake, as discussed in section 3.4.

With transit in a present state of lower ridership and dependence on subsidies, and in the development patterns today that encourage automobile use, a closer look into the viability of transit company investment in land development can provide valuable lessons to help transit companies expand their ridership and become more financially independent. The following chapter presents a history of transit investment in land development, the recognized benefits associated with investment and involvement, and different levels of involvment in land development. Examples of US and international cases of such involvement are also presented.

4.1. Historical Perspective

In the late 19th century and early 20th century, when public transportation was in its heyday, many transit companies were making significant profits and therefore had the capital to invest in land development. Yago (1984) asserts that “land speculators and transit owners nearly always

spoke with one voice (and were sometimes the same person)," and therefore implies that transit company owners realized that their services were redistributing the population within their city and realized the profits that could be made from capitalizing on land development and sales in the less developed areas to which their companies provided service. The connection between land development and public transportation was thereby established.

During this period of rapid growth in urban areas, many Americans desired to leave the grimy and overcroweded cities for the cleaner air and more open space that suburban areas offered, and reliable transit service made it possible for many Americans to achieve this goal. With the involvement of transit companies in the development of new suburbs, development could occur in such a way that residents and shoppers were dependent upon transit, so the suburbs of the early 20th century can be considered an example of transit-oriented development (Foster, 1981; Bernick and Cervero, 1996; Hendricks and Goodwill, 2002). Muller (2004) also notes that the suburbs were created on the outskirts of cities largely because developers had more room to work in the less-dense city perimeters, but that transportation was essential to connect these suburbs to the work and shopping attractions of the city. Yago (1984) notes that street railways around the turn of the century were mostly profitable from the land investments that the transit companies made and not from the actual operation of the transit lines, which at that time were in turmoil over the call for public ownership and the rising cost of operations as previously mentioned in Chapter III. In the early 20th century, transit agencies not only participated in land development, but also invested in it.

Transit companies' involvement in land development in the United States slowed as the 20th century progressed. As suburbanization became more widespread across the United States, and as the automobile became more available to the average citizen, transit use declined. Indeed, the suburbs that transit created in the early 1900's contributed to the decline of tranist over the next century. As people moved to the suburbs, and as the suburbs themselves became more and more spread out, the land use became less mixed, and population became less dense. Transit use in urban areas declined as people were able to buy automobiles to move easily within the suburbs in a way they often could not do by using transit.

In the 1970's, as public transit became publicly owned as a result of financial woes, transit companies shifted their focus to more strictly defined transit operations such as meeting demand and away from land development (Hendricks and Goodwill, 2002). The initiatives mentioned in section 3.3.B. have gained popularity in recent years, but their occurrences are not widespread.

4.2. Levels of Involvement

The participation of transit service providers in land development can take several forms at several levels. Cervero *et al* (2002) identifites three main levels of involvement in land development: proactivism, coordination and facilitation, and inactivity. The three are explained in this section.

“Proactivism” involves transit agencies “aggressively seeking to influence land development around their transit facilities” (Cervero *et al*, 2002). This means that transit companies will proactively seek out opportunities to develop their own land around transit stations as well as actively attempt to influence the owners and developers of land they do not own to develop in such a manner as to promote transit usage. It should be noted here that the level of proactivism involves transit agencies driving the development process. This level of involvement requires a deep commitment to the principle that transit companies shouldfinancially invest and participate in land development. Of course, the transit companies must be able and willing to accept the financial risks of investing without a clear timeline for anticipated returns, and they must be willing to either hire or train employees in land development details (Cervero *et al*, 2002).

“Coordination and facilitation” is a more common level of involvement that transit service providers take in land development than is proactivism (Cervero *et al*, 2002). Coordination and facilitation can include the transit agency consulting with developers about how local land can be developed to encourage transit usage and improve the communitites around transit stations, transit incentives to cities where developments are constructed to fit with and promote transit, and even, as in the case of the Tri-Met company of Portland Oregon, even donating transit agency land to developers who are willing to develop in accordance with the goals of transit (Cervero *et al*, 2002). However, coordination and facilitation can take other forms. Among the three instituational policies and practices that Christopher (2006) mentions, one recognized as being highly important is the communication framework that either exists or can be established between planning agencies and transit agencies. Coordinator and facilitator agencies do not lead the development process, but they do offer crucial assistance during the development process.

Perhaps the most common level of involvement, particularly in smaller and even medium-sized cities, is “inactivity” (Cervero *et al*, 2002). Some are simply unable to involve themselves given limited budgets and other immediate pressing issues, while others do not feel that transit would be a legitimate player in land development (Cervero *et al*, 2002; Christopher, 2006).

4.3. Recognized Benefits of Involvement

Transit-oriented and joint development, which are defined in section 3.3.B., can be of the highest level of involvement (if the development is driven by the transit agency and not another stakeholder) of transit service providers in land development Both can involve investments by the transit agency in land development. Therefore, the benefits of the highest levels of *involvement* are also likely to be the benefits from the highest levels of financial *investment*. The benefits that result from the highest levels of involvement and investment are numerous. Of course, transit agency profit is a driving motivation. But there are other benefits to the community and to the earth that result from the involvement, and ideally the investment, of transit agencies in land development. This section presents the benefits that the highest levels of involvement and investment can affect.

Papa *et al*. (2008) reminds the reader that there are two goals that drive the creation of TODs and JDs. The short term goal is to provide a financial lifesaver to transit companies that currently depend on governmental assistance to provide their service, and the long term goal, which provides more economic, social, and health benefit to society in the long run, is to increase

transit ridership and to shape future developments to achieve a more livable and sustainable community. In order for transit-oriented developments and joint developments to truly benefit the public, both goals must be kept in mind.

The benefits of the involvement of transit service providers in transit-oriented and joint developments as identified by several sources are provided below in Table 4.

Table 4. Benefits of Transit-Oriented Development and Joint Development

Transit Agency	
Benefit	**Source**
Increased Ridership	Cervero *et al* (2002), Arrington and Parker (2001), Hendricks and Goodwill (2002), Evans *et al* (2007), Cervero *et al* (2004)
Increased Revenue	Cervero *et al* (2002)
"Strengthen Institutional Relationships"	Cervero *et al* (2002)
"Efficiency in Transit Service"	Cervero *et al* (2002)
"Land Development Profits"	Cervero *et al* (2002)
Homebuyers	
Benefit	**Source**
Mobility	Arrington and Parker (2001), Hendricks and Goodwill (2002)
Affordable Housing	Arrington and Parker (2001), Cervero *et al* (2004)
"Increase households' disposable income"	Arrington and Parker (2001)
The General Community	
Benefit	**Source**
Safety	Arrington and Parker (2001), Evans *et al* (2007), Cervero *et al* (2004)
Reduced Traffic	Cervero *et al* (2002), Arrington and Parker (2001), Hendricks and Goodwill (2002), Evans *et al* (2007)
Reduced Environmental Impacts from Air Pollution	Arrington and Parker (2001), Hendricks and Goodwill (2002), Evans *et al* (2007), Cervero *et al* (2004)
Economic Development	Cervero *et al* (2002), Arrington and Parker (2001),
Decreases Infrastructure Costs	Arrington and Parker (2002), Evans *et al* (2007)

As is shown in Table 4, three groups benefit from transit agency involvement in land development. Those groups are the transit agencies themselves, homebuyers, and the community

in which the development is located. Each group experiences unique benefits from TODs or JDs, and those benefits are discussed in this section.

Transit Agencies

Ridership increase is the most common benefits listed in the column of transit agency benefits from land development. This increase is intuitive, as transit companies have a say in the development process, and can therefore promote design guidelines and other specifications such that the people who live, work, and shop in the developments can use transit very easily and inexpensively in comparison to using their automobiles. Ideally, the most complete developments will by their very design discourage auto usage within or near the development, and this deterrence will likely encourage the use of other modes, such as walking or transit.

Hanson (2004) and Wachs (2004) both note that land values and transit accessibility have a direct relationship. This can benefit transit agencies that wish to make profits from renting, selling, or leasing their developments. However, some, such as Giuliano (2004), have doubts based on empirical evidence that that relationship is in fact true across the board. Reconnecting America (2007) offers a picture to support the positive impact that transit-friendly development has on land values: in Arlington, Virginia, in a decade's time, the land around transit stations increased by 81%. The same study notes that the value of the land developed for housing and commercial use within 2 blocks of The Pearl District streetcar station in Portland, Oregon, was worth $2.3 billion in 2005. Of course, were transit companies to sell or lease these developed properties, they would turn a significant profit.

Homebuyers

The first and most obvious benefit that homebuyers derive from transit company participation in land development is increased access and mobility options. With transit company participation input into the development process, developments can have the necessary transit-supportive infrastructure (such as sidewalks leading to transit stations and rail infrastructure) and operating schemes to serve the new developments. When transit becomes as (if not more) safe, efficient, convenient, cost-effective, and otherwise as appealing as private automobiles, homeowners will be more likely to use the transit option for their daily trips. Of course, studies have shown that an increase in property values follow developments that have a strong transit presence. The Reconnecting America (2007) study "Why Transit-Oriented Development and Why Now?" finds that land values increase with transit-friendly development. Such an increase can work in the homebuyer's favor as well, should the owner decide to sell the home. Furthermore, the reduced transportation costs associated with using transit can be a big benefit to residents. Benefits such as these create demand for transit friendly development among homebuyers and make them more willing to invest in properties that are transit-supportive. This in turn benefits the transit agencies that participate and invest in the new developments.

Community

A common benefit for the community is a decrease in the damage that a development inflicts upon the environment. For example, the reduced congestion that Goodwill and Hendricks (2002) and Cervero *et al* (2002) mention directly leads to the improvement in air quality, which four out of the five sources cited in Table 4 give as a benefit of transit-oriented development. This is intuitive, as reducing the amount of automobile trips reduces congestion, which in turn reduced

emissions. Of course, for such an effect to be noticeable, transit-oriented development, joint development, and smart growth must become more widespread than they currently are. Since the financial benefits to transit agencies and homebuyers alike are so attractive, there is a chance that these initiatives can become popular enough in the future to positively influence the environment. Furthermore, Cervero *et al* (2002) cites "[spurring] neighborhood redevelopment" and Cervero *et al* (2004) cites "[creating] a sustainable built form" as benefits of TODs. Both of these benefits promote the ideal of livable and sustainable communities, an ideal that is hard to quantify but nonetheless meaningful to the community members themselves.

4.4. Case Studies

Around the world, the practice of transit agencies involving themselves in land development is common. However, the extent to which the agencies involve themselves range from no involvement whatsoever to extensive involvement with extensive financial investments in the developments. For the agencies that participate and invest heavily in land development, the mechanism by which that development, including the purchase of the land, is funded is of great interest. Also of interest is the extent of the profits that agencies experience from such investments. This section provides examples of different levels of transit agency involvement and investment in land development throughout the United States and in foreign nations.

4.4.A. Highest level of involvement: proactivism

The United States: Washington, DC and Other Cities

Perhaps the best example of proactivism of transit companies in land development in America is the case of the Washington Metropolitain Area Transit Authority (WMATA). According to Cervero *et al* (2004), WMATA "aggressively seeks out mutually advantageous transit joint development opportunities." In fact, the same report states that as of 2003, WMATA had hired its own TOD personnel (Cervero *et al*, 2004). Because of its early initiative and early invovlement in land development, WMATA definitely participates in land development at the level of proactivism.

WMATA owns the land on which it pursues joint development due to the federal government's financial assistance before the metro system was even built the 1970s. In acquiring the land to build the original metrorail system, the federal government bought more land than was strictly necessary to avoid creating unusable leftover land parcels, and the property became WMATA's to develop later on (Cervero *et al*, 2004).With the land readily at their disposal, the company was able to partner with land developers to create developments that can be leased or sold to generate great revenue. Indeed, as of 2004, WMATA's Metro Center in Bethesda generated the most profit of all the transit-oriented and joint developments in the U.S. with $1.6 million in lease profits (Cervero *et al*, 2004). Doubtless, ridership and revenue from fares went up as well, as the development attracted new riders.

The Metro system in Houston, Texas, also invests in land development. METRO invests in joint development of its properties, beginning with a soliticitation for developers (Metropolitain Transit Authority of Harris County, Texas). The process is well established and documented. Dallas Area Rapid Transit (DART) also engages actively in TOD activities, and also actively seeks new land for such opportunities (DART, 1989).

In the cases of high levels of transit involvement and investment in land development in the U.S., transit agencies such as WMATA receive significant profits for their investment. Of course, it goes without saying that when land is developed to promote transit use, the community will receive the benefits presented in Table 4 that results from increased ridership.

China: R+P

37% of the public transit trips in Hong Kong, China are made on the railways of the Mass Transit Railway Corporation (Loo *et al*, 2010). The use of public transit in China is very common, and developments related to transit are frequently successful. A handbook put together by Agence Francaise de Development and the French Ministry of Ecology, Energy, Sustainable Development, and the Sea, or AFDFMEESDSA (2009) presents the high density of Hong Kong as a contributing factor to the success of the developments in which the MTCR invests. The MTRC's unique funding relationship with the Hong Kong government ensures its success with minimal dependence on government subsidies. The mechanism that the MTRC uses to involve itself in land development is the Rail+Property Development (R+P) system. Indeed, since the government and the privately-owned MTRC partner to make these projects a reality, the projects

themselves can be considered joint developments. In fact, AFDFMEESDSA (2009) cites the Hong Kong developments as the most successful joint developments in the world.

The first step in the creation of the development is for the government of Hong Kong to give the MTRC a land grant, thereby saving the company the trouble of purchasing the land around the proposed rail stations (Cervero and Murakami, 2008). Then, a developer must purchase the rights to develop from the MTRC at a an after-rail price that is much higher than the MTRC paid under the land grant, and the developer and the MTRC reach an agreement about co-ownership of the property and the way profits from the development will be divided (Cervero and Murakami, 2008). Cervero and Murakami (2008) also mentions that the MTRC has policies that reflect its belief in its role of bettering the community by collaborating with city planners and others to develop large, transit-oriented developments. Unlike other governments that must frequently subsidize and support public transit companies as the companies and the communities they serve age, the government of Hong Kong invests in a one-time initial land grant at the beginning of each project to ensure that the company will be able to sustain itself in the future. The profits from these developments are re-invested in more developments. The reliance of the MTRC in subsidies has in this way decreased over time.

The increasing growth in China has led to increased suburbanization in China, much like the explosive population increase and immigrant influx did in the United States in the first half of the 1900's (Cervero and Day, 2008). Urban rail is a very popular mode of transit in China, and the TODs that support urban rail operations are increasing rapidly. The government of Hong Kong is

very supportive of transit in its regulations: zoning regulations are specifically designed to promote mixed land use (Dunleavy, 2001).

Of course, the biggest benefit resulting from the invovlement of the MTRC in land development is profit to the MTRC. Cervero and Murakami (2008) models the increase in ridership that occurred as a result of higher densities, which the R+P projects in Hong Kong most certainly create. Therefore ridership increases (and therefore an increase in revenues from fares) is a benefit. Similarly, Cervero and Murakami (2008) uses a statistical model to show that R+P projects have higher housing price premiums than housing that was not a part of an R+P project. This means that revenues from leases are likely significant for the MTRC. Thie means that increased lease revenues are a beenfit resulting from the MTRC's participation in land development. Basically, the investment in R+P developments has been financially remunerative to the MTRC. The MTRC's R+P developments are a good example of how public transit companies can sustain themselves financially with little reliance upon government subsidies and make a positive impact on the environment and livability of the area.

Japan

In Nagoya, around 77% to 78% of the operating costs of publicly owned bus transit are covered by farebox revenue (Dunleavy, 2001). The degree of involvement that privately owned Japanese transit service agencies take in land development in Nagoya varies from company to company. One of the privately operated rail companies in Japan, the Tetsudo Railroad Company, does invest in real estate, and it draws about 15.6% of its profits from that source (Dunleavy, 2001).

The situation that the public Teito Rapid Transit Authority in Tokyo finds itself in is similar to that of the publicly owned transit companies in Nagoya, with farebox revenues covering only 86% of operating costs (Dunleavy, 2001). Private rail companies in Tokyo have turned to real estate investment to help finance the transportation service. Cervero and Murakami (2008) asserts that as of 2006, all of the private rail companies in Tokyo earned significant amounts of their revenue from real estate endeavors. In fact, according to Gilbert and Ginn (2001), transit investment in land development in Japan has caused increases in land values around transit stations. This in turn creates more interest in investment in that land from transit agencies.

The private companies in Japan acquired the land for development and investment from the government. In the case of the JR East and Tokyo Metro companies, a term of their privatization deal in the late 1980's was the granting of land to the companies for development and real estate purposes, but as of 2008, only the the JR East company had been very active in development (Cervero and Murakami, 2008). In this way, the subsidies that are given to transit companies are on a small scale (Priemus and Konings, 2001). Indeed, Japanese rail companies made 5-42% of their operating income from land value capture activities such as real estate (AFDFMEESDSA 2009).

Basically, in Japan the government promotes development, and the transit companies, whether public or private, must simply follow the plan, entitled the "New Comprehensive National Development Plan" (Dunleavy, 2001). This plan promotes livable communities and both domestic transit friendly development and international transportation centers, but leaves the actual details to individual prefectures, who must develop a 10-year plan for development

(Dunleavy, 2001). The plan promotes transit usage, and encourages the kind of development that transit companies desire. In this way, land development not only turns a profit for Japanese transit agencies by providing new real estate investment opportunities but also shapes development in such a way that transit use is encouraged.

In the case of several US transit agencies, the MTRC in Hong Kong, and several Japanese transit agencies, investment in land development does occur and can be a significant supplement to the revenues produced by fares. In the cases of the WMATA and the MTRC in particular, the government's help in purchasing the land makes a big impact on the agency's decision to invest in the land development, and consequently in the amount of profits each agency sees. It is important to note that this initial aid in purchasing the land is in fact a subsidy. However, this subsidy is sustainable, as once these agencies invest in the first development, part of those profits can be invested in future land development projects, which will likely yield profits. These profits have a snowball effect, and in this way, an initial subsidy given by the government to aid the transit company in acquiring land will help transit agency reliance on subsidies decrease over time.

4.4.B. Moderate levels of involvement

Florida, Pennsylvania, California, and Minnesota

The Facilitation and Coordination role can be thought of as the moderate level of involvement. The examples identified by Christopher (2006) are largely examples of transit agencies in the facilitation and coordination role. A factor that contributes to the success is early invovlement in the planning process. The Central Florida Regional Transportation Authority works with developers to make changes and developments that focus on improving the service the transit company offers the area, which will improve the development, and finds other funding for capital improvements (Christopher, 2006). The Centre Area Transportation Authority in Pennsylvania makes reasonable requests from developers early on in the project and works with the developers to find ways around problems that incorporation transit into the development might pose (Christopher, 2006). In these cases, the transit agencies coordinate with land developers and take upon themselves the role of coordinator and facilitator. The transit agency does not lead the development process.

Two of the other agencies that Christopher (2006) explains as participating in land development are Omnitrans of California and Metro Transit of Minnestora, and they participate more from a planning standpoint. Omnitrans participated with the government in developing a Community-Based Transportation Plan that has regional components, while Metro Transit in Minnesota was actually merged with other governmental agencies into the Metropolitain Council, which, amongst other things, addresses community planning and transit services. These agencies have close ties to local governments and influence over land developers through those ties. In these cases, the coordination occurs between the transit agencies and the government, but the agencies themselves still participate at the “coordination and facilitation” level of involvement.

In all of these American examples, the benefits resulting from moderate transit agency involvement, which interestingly enough does not in the presented cases include direct investment, are to the community from improved service and more compact and focused land development. Benefits in terms of increased ridership are the benefits experienced by the transit agencies.

Plano, Texas:

Another example of transit company invovlement at the "facilitation and coordination" level in land development is that of Plano, Texas in the 1990's. The Dallas Area Rapid Transit (DART) agency worked closely with the city of Plano to create a transit-friendly environment in downtown Plano, Texas. The arrangements of the agreement were that DART would purchase the land necessary for the development, which was designed to rejuvenate a failing downtown area, and the city of Plano would be responsible for the utilities and making the station accessible, with DART reimbursing the city for construction costs above and beyond the value of the purchased land. This agreement was expanded upon to create a larger-scale transit-oriented development in downtown Plano. In this case the city was the driving force behind the development and urban rejuvenation, but a significant amount of the property that was developed was purchased from the previous owners by DART in the late 1990's (Turner, 2012). In this case, DART took the role of facilitator and coordinator, since their purchase of the land and agreement to assist the development greatly aided in the development process, but the actual development itself was set in motion by the city of Plano before DART became involved. The

city of Plano benefitted from the new, more liveable development in their community, and DART benefitted from increased riderhsip, which met its 2010 projected goals (Turner, 2012).

Copenhagen, Denmark

One particular case study presented in the handbook put together by AFDFMEESDSA (2009) examines the benefits that Metroselskabet, the public transportation company responsible for Copenhagen's public transit system, derived from its participation in land development. According to the handbook, the company paid for half of the cost of developing a line addition to the transit system by selling plots of land owned by the city of Copenhagen, which is a partial owner of the company, and other governmental agencies. The other half of the costs were covered by fares from ridership after the land was developed and sold. However, the urban form of Copenhagen also furthers transit interests in the area: Copenhagen's development occurs along lines that radiate out from the central city (Newman and Kenworthy, 1996). Development that occurs is compact, mixed-use, and attractive, and the city itself furthers transit interests by reducing the available parking in the city by a set 3% each year (Newman and Kenworthy, 1996). Basically, the investment of transit agencies in land development in Copenhagen is supported by development and parking policies put in place by the city.

In the case of Copenhagen, the city was the driving force behind the development. In this case, transit agencies did experience direct benefit from their involvement in real estate and development by covering the costs of a new line. Of course, the community benefitted from the

line as well. In this case, a moderate level of activity benefitted both the transit agency and the public.

Istanbul, Turkey

Similarly, the Istanbul Metropolitan Municipality participates in land development. After the plans for a development that would serve transit interests not only by creating a shopping and business destination for transit users but also by housing a repair shop for passenger train carriages were agreed upon, the land for the development, which was publicly owned, became the property of the nation's housing and urban development administration and was consequently sold to cover the project costs (AFDFMEESDSA, 2009). Furthermore, the same handbook notes that at the time of publication, plans were underway for projects funded in a similar manner.

In this case, the investment itself wasn't made by the transit company specifically, but the agency did participate in the development, so the agency acted in the coordinator and facilitator role. As in Copenhagen, in Istanbul there are benefits to both the transit agency and the community from transit agency participation in the development. The transit agency was able to cover the costs of a capital improvement, and the community benefitted from the new space and the economic activity it ignited.

The benefits obtained from moderate transit agency investment and involvement in land development is felt by both the transit agencies themselves and the community. However, unlike the large financial benefits those agencies that invest and participate at the highest levels of

involvement in land development, the benefits that agencies receive from investing and participating at the moderate levels of land development are more limited. Still, however, benefits to both groups are significant enough to be noted.

4.4.C. Inactivity

Singapore

Other countries such as Singapore have a system of transit planning that functions well despite the fact that it is organized and funded differently than the highly efficient way the R+P developments are funded in Hong Kong. Hong Kong's R+P projects are the result of the efforts of private companies that both own and operate the transit system, while in Singapore the government owns the rail lines and directs the property development around those lines while the SMRT Corporation and the SBS Transit Company actually operate the system with government subsidies (Cervero and Murakami, 2008).

Neither the SMRT nor the SBS companies participate or invest in land development or real estate to supplement their farebox revenue (Cervero and Murakami, 2008). Leading up to 2008, the SMRT Corporation fell slightly short of covering its operating costs by farebox revenue and revenue from advertising ventures, and the SBS covered its operating costs by fare revenues alone (Cervero and Murakami, 2008). The operating subsidies given to the transit operators

come from a government fund that is bolstered by taxes and fees on automobile ownership and usage and land-development related activities (Cervero and Murakami, 2008).

Making the land development transit-friendly is the responsibility of the Housing Development Board and the Urban Renewal Agency in Singapore (Cervero and Murakami, 2008). The rail transit operators in Singapore benefit from the transit-friendly development that these agencies encourage and enable only in terms of the increase in ridership and indirectly the increase in property taxes which will fund the subsidies they receive: these companies receive no direct finances from real estate or lease revenues.

In cases similar to that of Singapore, government policies such as taxes and fees take the lead in encouraging transit ridership, which in turn increases transit revenue. When revenue isn't enough to cover operating costs, government subsidies make up the difference from funding raised by the taxes and fees on car use. The system is very functional, even though the transit agencies do not invest in land development.

4.4. Lessons Learned

So far in Chapter 4, many examples of transit systems investing (or not investing, as the case may be) in land development have been presented. From these examples, two lessons can be derived:

1. The level of involvment a transit company takes in land development is related to the benefits received by the transit agency.
2. Government policy is a strong factor in the success of a transit system, and in some instances may substitute a transit agency's direct investment in land development for a successful system.

These two conclusionss are further explained in the following sections.

4.4.A. Levels of involvement affect benefits received

As with anything else, the amount of effort that an agency puts into a development affects the benefits the participants will receive from the project. In this specific case, the higher the levels of involvement and investment that transit service providers take in land development, the greater the financial rewards they receive will be. The MTRC of Hong Kong is an excellent example. The MTRC is aggressivley proactive with its investments in new joint and transit-oriented developments. As a result, it is considered one of the most successful instances of transit investments in land development in the world. A similar approach is practiced in Washington, DC, where WMATA is actively invovled in developing and selling land it already owns to turn a signficant profit. Some transit service providers in Japan draw significant portions of their income from real estate revenues. In all three instances, the proactive investment and participation of transit companies in land development was financially remuneratvie to the

agency, and when the projects were designed to encourage transit use, the community expereienced signficant benefits as well.

Transit company involvement in land development at the coordination and facilitation level can also be beneficial to the companies and the communities they serve, but the financial benefits to the transit agency are on a somewhat smaller scale. An illustrative example for this is that of Istanbul, Turkey. The transit agency's participation in a consulting and coordinating capacity with the government to actively sell the land on which the development (including the rail carriage repair shop) was to be built was a successful means of funding a capital expenditure for transit while providing the benefits mentioned in previous sections to the local community. In Copenhagen, the transit agency's participation in plans for development and the actual development itself was essential to the projct's success. In both cases, the developments and participation were on a smaller scale than those of the agencies that participate in land development proactively, and the profits experienced by the Copenhagen and Istanbul projects were not as great. However, in both cases, the benefits to the community were important, as they are in other areas of the United States. Other than increased ridership that might result from transit agency input, the benefits to the community were the primary benefits of the involvement among cases of transit agencies participating at the coordination and facilitation level.

Of course, the direct relationship between activity and the financial or other benefits that a transit agency and community derive does not seem to hold true for all transit companies that are inactive in land development. In Singapore, as in other many other cities worldwide, transit agencies do not invest in land development. While Singapore transit agencies do not cover all of

their operating costs with fares, the public transit system is efficient and has good ridership. The fact that ridership is still strong in Singapore indicates the presence of other factors, such as government policies that encourage transit use, that affects the success of transit in an urban area.

4.4.B. Government policy and success of transit

The other factor having a significant impact on the success of a transit system (whether or not the transit agency invests or participates in land development) appears to be government policy in the region. In the instances where transit does invest in land development, local policies that support and encourage transit usage are just icing on the proverbial cake for a project that was likely to be successful merely from real estate sales after development. For agencies that do not invest in land development, such as those in Singapore, policies that make transit more attractive or encourage people to drive less can substitute some of the success that the agencies lose from their inactivity in land development.

For example, in Singapore, taxes on car useage are used to subsidize operating costs, so transit agencies can provide an effective alternative to those who cannot afford or choose not to drive. In Singapore the government has control over housing and new development, so transit interests are always represented in new developments. In Copenhagen, the reduction of parking in urban areas and the commitment to transit-friendly development on the part of the government encourages transit usage. In these cases, strong government policies encourage transit-friendly development, though the transit service providers themselves do not actively participate, and

transit ridership is strong enough that the operating subsidies these agencies require are small enough to be easily funded by taxes or other means.

Higher levels of involvement in land development typically lead to more benefits to transit agencies and the community, but with the right supporting government policies, inactivity can still lead to adequate transit service and strong ridership. However, even strong ridership may not be enough to cover operating costs, so the investment of transit agencies in land development can be a useful practice to reduce the dependency of an agency on operating subsidies.

4.5. Survey Results

The following section details the results of the analysis of the survey questions that addressed the practice of transit agencies investing in land development. Levels of involvement in land development were cross tabulated with policies, and frequency distributions were run on questions that directly addressed the practice of transit agencies investing in land development and real estate.

4.5.A. Current levels and willingness of involvement

Of the transit agencies in the areas surveyed, 53.3% (8 responses) currently participate at the coordination and facilitation level, while 33.3% (5 responses) are currently inactive in land

development. The remaining 13.3% (2 responses) are unaware of the level of involvement that transit agencies in their area take in land development. Not a single one of the agencies surveyed is involved proactively in land development.

None of the transit agency interviewees feel that their agencies should participate in land development at the level of inactivity. However, the most common level of activity that transit agency representatives feel they should participate at is coordination and facilitation at 62.5%. Only one respondent (37.5%) feels that his agency should be proactively involved in land development.

Of the government planning agencies that responded to the survey, 28.6% (2 responses) would like to see transit agencies participate at the proactivism level, and 71.4% (5 responses) would like to see transit agencies participate in land development at the coordination and facilitation level. It is noteworthy here that the majority of government agencies would prefer transit companies to only take the coordination and facilitation role in land development rather than the proactivism role. It is also noteworthy that none of the agencies surveyed believe that transit companies should be completely inactive in land development.

The benefits that an agency perceives it has gained or will gain from participation in land development also impact their levels of involvement. Of the transit agencies that participate in land development at the coordination and facilitation level, 33.3% (1 response) feel that increased economic activity is the biggest benefit to the community, while 66.7% (2 responses) of the agencies feel that increased transit ridership is the biggest benefit to the community. Of

those that are inactive in land development, half feel that reduced congestion is the main benefit to transit investing in land development, and half believe that increased economic activity is the main benefit. This could perhaps indicate that transit agencies that do not participate in land development are inactive because they do not recognize increased ridership as an important benefit to their involvement in land development.

The benefits of transit involvement in land development offer valuable insight when viewed from a government planning agency perspective. Of the government agencies who claim that transit agencies in their area participate at the coordination and facilitation level, 50% (1 response) believe that reduced congestion is the biggest outcome to the community for transit involvement in land development, and the other 50% (1 response) believe that increased economic activity is the biggest benefit. Of the government agencies who claim that transit agencies in their area do not participate in land development, 66.7% (2 responses) believe that decreased congestion is the biggest benefit to transit participation, and 33.3% (1 response)believe that increased economic activity is the biggest benefit. Of the government agencies that do not know about the level of transit participation in land development in their area, half (1 response) consider increased economic activity the major benefit of transit involvement in land development, and half consider increased transit ridership as the major benefit of transit involvement in land development.

It is interesting to note that the government planning agencies who have transit agencies in their area that participate at the coordination and facilitation level do not consider increased transit ridership as the biggest benefit to the community resulting from transit participation in land

development. This might suggest that transit involvement in land development does lead to broader positive impacts to the community than just the benefit of increased transit ridership, which ultimately affects transit agencies the most.

4.5.B. Level of involvement and policies and practices

The folowing section details the conclusions that researchers are able to draw from survey responses to questions about policies and practices that impact the levels of involement and investement that a transit agency takes in land development.

4.5.B.1. Communication levels amongst agencies

Of the areas with transit agencies that participate at the coordination and facilitation level, the two most common levels of communication are moderate communication at frequent intervals (37.5%, or 3 responses), and strong communication at frequent intervals (37.5%, or 3 responses). Of the agencies that are inactive in land development, there is a pretty even spread amongst the levels of communication between government planning agencies and transit agencies. Of the two government planning agencies that are unaware of the level of involvement that transit agencies in their area take in land development, one (50%) claimed that they and transit agencies communicate strongly but at infrequent intervals, and the other one (50%) was unaware of the existing level of communication between his agency and transit agencies.

It is important to note that the most common level of communication is that of strong communication at frequent intervals, and that of the agencies that communicate at that level, 75% (3 responses) of the transit agencies participate at the coordination and facilitation level, while only 25% (1 response) are inactive. The same trend holds true for the second most common level of communication: that of moderate communication at frequent intervals. In that category, 100% of the 3 respondents participated at the coordination and facilitation level. These numbers indicate that frequent communication and higher levels of involvement are seen together, at least in the areas surveyed. This indicates that communication between government planning agencies and transit agencies supports transit agency participation in land development. Such participation, at its highest levels, can also involve investment, so this trend is relevant to both transit agency participation and transit agency investment in land development.

4.5.B.2. Subsidies and Financing

The question that addressed the kinds of subsidies and financial aid that transit agencies would most like to receive was a multiple response question; interviewees could select multiple answer choices at a time. Of the transit agencies surveyed, 37.5% (3 responses) would like to receive grants for transit-oriented development activities. 87.5% (7 responses) would like to receive direct financial subsidies for operating costs. 87.5% (7 responses) would like to receive direct financial subsidies for capital improvements.

Government planning agency officials were allowed to give multiple responses to the question asking about what forms of financial assistance they feel would benefit transit agencies. 57.1%

(4 responses) of the government planning agencies surveyed feel that grants for transit-oriented development activities would benefit transit companies. 57.1% (4 responses) feel that direct financial subsidies for operating costs would benefit transit companies. 42.9% (3 responses) feel that direct financial subsidies for capital improvements would most benefit transit companies. It is noteworthy that government planning officials rated grants for transit-oriented development activities as beneficial to transit companies as being as beneficial as direct subsidies for operating costs. From this data, one can conclude that government planning agencies recognize the benefit that transit agencies will experience from participating in land development.

Of the government planning agencies who feel that grants for transit-oriented development activities would most benefit transit agencies, half (2 responses) would like to see transit participate at the coordination and facilitation level, and half (2 responses) would like to see transit participate at the proactivism level. Of the government planning agencies would like to see transit agencies participate at the proactivism level, 100% (2 responses) feel that grants for transit-oriented development activities would most benefit transit agencies. Of the government planning agencies that feel that transit should participate at the level of coordination and facilitation, only 40% feel that grants for transit-oriented development activities would benefit transit agencies.

It makes sense that agencies that wish to see transit participate in land development at the higher levels of involvement would consider grants for transit-oriented development activities as beneficial to transit. It also makes sense that of the agencies that wish to see transit take a coordination-and-facilitation role in land development, not all of them would consider grants for

transit-oriented development activities as being beneficial to transit agencies. This might be because they would not expect the transit agency to participate actively enough in the development to require funding.

To summarize, many transit agencies and government planning agencies believe that the provision of subsidies for transit-oriented development activities is beneficial to transit companies. The provision of subsidies for these activities will, by removing financial obstacles, encourage transit to both participate and invest in land development.

4.5.B.3. Zoning policies

Of the agencies that exist in areas with zoning policies that are discouraging to dense, mixed land use, 100% (2 responses) participate at the coordination and facilitation level. Of the agencies that exist in areas with zoning policies that allow dense, mixed land use in certain areas, 40% (4 responses) participate at the coordination and facilitation level, while 50% (5 responses) are inactive in land development, and 10% (1 response) was unable to answer the question about level of involvement. Of the agencies that exist in areas with zoning policies that encourage dense, mixed land use in all areas, half (1 response) participate at the coordination and facilitation level, while half (1 response) were unable to answer the question about level of involvement. Finally, one agency was unable to answer the question about zoning, and the transit agencies that correspond to that area participate at the coordination and facilitation level. No clear trend is present from this data.

Of the agencies that exist in areas with zoning policies that are changeable with great difficulty, 66.7% (or 4 response) participate at the coordination and facilitation level, while 33.3% (or 2 response) are inactive in land development. Of the agencies that exist in areas with zoning policies that are changeable with moderate effort, 50% (or 3 responses) participate at the coordination and facilitation level, 16.7% (or 1 response) is inactive, and 33.3% (2 responses) were unable to answer the question about levels of involvement. Of the agencies that do not know about the zoning policies in their area, 33.3% (1 response) is a coordinator and facilitator agency, while 66.7% (or 2 responses) is inactive in land development.

No clear trend is apparent from this data, so it is difficult to tell if zoning policies and transit investment in land development are related.

4.5.B.4. Parking

Of the agencies that exist in areas with plenty of free parking, 40% (2 responses) are coordinator and facilitator agencies, while 60% (3 responses) are inactive in land development. Of the agencies that exist in areas with plenty of paid parking, 66.7% (2 responses) participate at the coordination and facilitation level, while 33.3% (1 response) were unable to answer the question about level of involvement. Of the agencies that exist in areas with plenty of free *and* paid parking, 100% (2 responses) participate at the coordination and facilitation level. Of the agencies that exist in areas with limited, free parking, 100% (1 response) are inactive in land development. Of the agencies that exist in areas with limited, paid parking, half (1 response) are inactive in land development, and half (1 response) are unable to answer the level of involvement question.

Of the agencies that exist in areas with limited free and paid parking, 100% (1 response) participated at the coordination and facilitation level. Of the agencies that are unable to answer the parking question, 100% (1 response) participate at the coordination and facilitation level. Of the agencies that participate at the coordination and facilitation level, the most common parking situations include plenty of parking (free or paid). Of the agencies that are inactive in land development, the most common parking situation (60%, or 3 responses) is plenty of free and paid parking. The trend appears to be that the presence of free parking corresponds to increased levels of inactivity among transit agencies. This supports the literature presented in chapter 3.

The presence of free parking corresponding to inactivity indicates a barrier to both participation and investment in land development. If the presence of free parking near a development affects the success of a development, it makes sense that transit agencies would be unwilling to take the financial risk of investing in a development that is less likely to succeed because of local parking policies. In this manner, the presence of free parking is a barrier to transit investment and participation in land development.

4.5.B.5. Trip reduction ordinances

Of the agencies that are subject to trip reduction ordinances, half (1 response) participate at the coordination and facilitation level, while half (1 response) are inactive in land development. Of the agencies that are not subject to trip reduction ordinances, 70% (7 responses) are involved in land development at the coordination and facilitation level, while 30% (3 responses) are not

involved in land development. Of those that do not know if their areas are subject to trip reduction ordinances, 33.3% (1 response) is inactive in land development, and 66.7% (2 responses) were also unable to answer the question about level of involvement.

Of the agencies that are involved in land development at the coordination and facilitation level, 87.5% serve areas that are not subject to trip reduction ordinances. Of the agencies that are inactive in land development, 60% (3 responses) serve areas that are not subject to trip reduction ordinances. The presence of trip reduction ordinances does not appear to correspond to any one level of participation in land development.

4.5.C. Investment question analysis

Several questions in the survey inquired about transit agency and government planning agency opinions about certain aspects of transit agency investment in land development. Opinions on the practice of transit agencies investing in real estate (with no development necessary) were also asked. This section details the results from the frequency analysis run on the responses for those questions.

Transit Agency Results

The concept of transit agencies investing in land development is not a new concept, but yet many out there are unaware of it. 80% (4 responses) of the transit agencies are familiar with the

concept of transit agencies investing in land development, but none of the ones surveyed claim to be actually involved in land development. This trend alone signals that there are barriers other than a lack of awareness of the practice that affect transit's decision to invest and participate in land development.

It is important to note that investment in land development and investment in real estate are both considered in this study. Over half the representatives surveyed feel that their investment in land development is feasible for their agency. A lack of funding is one reason that agencies feel they cannot invest in land development, and another reason is lack of expertise in the area. The majority of transit agencies surveyed (60%, 3 responses) are unable to invest in real estate (which would entail buying and selling property that does not require development).

The majority of transit agencies feel that in an ideal world they should invest in land development, but only in projects that have a potentially high impact on ridership. Not a single respondent said that transit agencies should not invest in land development whatsoever, so transit agencies obviously see the relationship between transit and land use and feel like transit should be an active participant in land development to increase its own interests.

Several factors affect the decision of transit companies to invest in land development. Funding is one major factor. The majority (80%, or 4 responses) of transit agencies surveyed feel that the provision of grants or subsidies for the purpose of purchasing land to develop or sell would greatly influence the agency's decision to invest in land development. This leads researchers to believe that funding the initial purchase and or development of land is a big obstacle for transit

agencies who might wish to invest in land development. Similarly, the transit agencies surveyed unanimously feel that grants for the planning and/or construction of new developments would affect their decision to invest.

Another major factor is the availability of land developer expertise. The majority (75%, or 3 responses) of the agencies surveyed feel that their decisions to invest in land development would be influenced by the availability of land developer expertise for the project. This implies that transit agencies may not always be equipped to handle land development details without outside help, and the lack of readily available expertise might be perceived as a barrier to investment in land development.

Government Planning Agency Results

About a third (1 response) of the respondents had heard of the practice of transit agencies investing in land development before taking the survey, and the remaining third had not.
Of the government planning agencies that were represented in the survey, a third (1 response) believed that investment in land development would be feasible for agencies in their area, a third (1 response) believe that the investment would not be feasible, and a third (1 response) were unable to answer the question. About half of the government planning agency representatives that have an opinion on the feasibility of transit agencies in their area investing in land development, only about half feel that the transit agencies in their area can feasibly invest.

About half of the government planning agencies surveyed believe that the transit agencies in their area would be able and willing to invest in real estate. Investing in real estate would mean that transit agencies would invest in already-developed properties that may or may not have the potential to impact ridership in the area. The other half believed that transit agencies in their area would not be able or willing to invest in real estate.

The government planning agencies surveyed believe that transit agencies should invest in land development. Only a third believes that investments should be made whenever possible. The remaining two thirds believe that investments into projects that have a potential to impact ridership should be made. The important trend to note here is that not a single respondent believe that transit companies should not invest in land development.

However, barriers do exist that make it difficult for transit agencies to pursue the level of involvement they would like to have in land development, and opinions and attitudes about those barriers were revealed in some of the free-response questions of the survey. One barrier cited by a local government planning agency representative is the unwillingness of some local government to allow transit agencies to invest in land development, which appears to contradict the other survey data. Some survey responses indicated that the previous negative political experiences of transit agencies in other areas who invested in real estate would influence transit companies against investment in real estate. Also, some survey responses indicated that continuity in policies and support levels from the local government between election cycles would be a significant encouraging factor for transit investment in land development.

4.5.D. Summary of interview results

From the trends presented above, several barriers can be identified. Table 5 presents these barriers.

Table 5. Barriers to Transit Agency Involvement

	Barriers
1	Presence of free parking
2	Lack of initial funding
3	Lack of recognition of connection between involvement and benefits
4	Lack of meaningful communication between transit and government agencies
5	Lack of land development expertise withing transit agency

These barriers are largely intuitive. Note that zoning policies and trip reduction policies are not listed as barriers. Due to the small sample size, no clear trend in the data for those questions was apparent to researchers, so no conclusions about barriers related to those policies are drawn in this study.

CHAPTER V CONCLUSION AND DISCUSSION

The current state of public transit in the United States is such that many agencies are beginning to explore new revenue-generating schemes. Investment in land development is one such scheme. Transit agencies can buy, develop, and sell land to meet two goals: encouraging transit ridership by the design of the development, and turning a profit from leases and real estate after the development. In some agencies in other nations, and even in a select few cases in the United States, transit agencies have obtained land (typically with the help of the government), developed the land in such a way to promote transit use among those who are intended to use the development, and then leased the development out to residents and businesses to generate revenue. In some cases, the profits from land development are re-invested in more land development projects, and profits grow at a significant rate. Of course, as with anything else, the level of involvement that an agency takes in land development does directly affect the profits that the agency recieves from that development, except in cases where supporting local policies encourage ridership in such a manner that agencies derive benefits from ridership generated by new developments in which the transit agency is not involved.

This study aimed to identify policies, practices, and attitudes that pertain to transit investment and involvement in land development. The results of the surveys identified trends and barriers pertaining to transit involvement and investment in land development. Those barriers and trends are presented in Table 6 below.

Table 6. Results

	Barriers
1	Presence of free parking
2	Lack of initial funding
3	Lack of recognition of connection between involvement and benefits
4	Lack of meaningful communication between transit and government agencies
5	Lack of land development expertise within transit agency
	Trends
9	Knowledge about the practice is relatively common
10	Government planning agency officials are highly supportive of the practice.

Transit agency participation and investment in land development was found to be related to the above barriers and trends. No trends regarding zoning policies or trip redution ordinances were identifiable.

Overall, the barriers are intuitive and confirm literature review findings. Identifying these barriers gives transit agencies and government planning agencies a starting point for the process of incorportating transit in land development. Knowing that the presence of free parking, lack of intial funding, and the other barriers identified in Table 6 are present in an area, local government planning agencies and transit agencies can work together to overcom e the issues that prevent transit from investing and participating in land development. Furthermore, the identification of thetrends in Tabl e 6 gives valuable insight into the state of knowledge and support that exists in the surveyed areas. Knowing that knowledge of and support for the practice exists, transit agencies should be encouraged to invest and participate in land development.

There is much opportunity for future research. Larger studies might provide more insight into the trends presented in this study, and more in-depth statitsical analysis of data might reveal new

trends. Another interesting area of future research would be the quantitative examination of the relationship between the level of involvement that a transit agency takes in land development and the subsidies the agency receives over time. In this study, only three stakeholders in land development (transit agencies, government planning agencies, and land developers) were examined, but future research should be conducted to examine the views and attitudes of the public toward transit investing and participating in land development. Such a study can possibly draw from the TCRP Report 47, "A Handbook for Measuring Customer Satisfaction and Service Quality" (Morpace International, Inc, and Cambridge Systematics, Inc. 1999).

Hopefully, this study presents valuable insight into the current state of practice of transit agencies investing in land development, and hopefully these insights can be used to the advantage of transit agencies and communities alike.

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APPENDIX

Transit Agency Survey

Land Developer Survey

Government Planning Agency Survey

Role of Transit Service Providers in Land Development

Questions for Transit Companies

Which of the following do you perceive would be the most significant outcome to your community from your agency participating in land development?

- *reduced congestion*
- *increased air quality*
- *increased public safety*
- *increased economic activity*
- *increased transit ridership*
- *revenue from land sales and leases*

To what extent does communication between governmental agencies and transit companies exist in your area?

- *no communication*
- *minimal communication at infrequent intervals*
- *minimal communication at frequent intervals*
- *moderate communication at infrequent intervals*
- *moderate communication at frequent intervals*
- *strong communication at infrequent intervals*
- *strong communication at frequent intervals*
- *don't know*

Does your agency actively seek communication with land developers regarding proposed new commercial or residential developments?

- *yes, we initiate communication*
- *we communicate with developers through another department (city planning department, etc)*
- *no, we wait for them to communicate with us*
- *don't know*

How easy is pedestrian and bicycle access to transit in your area?

- *easy (plenty of sidewalks and bike paths connect to transit stops or stations)*
- *moderately easy (transit stops or stations are mostly accessible to pedestrians and bicycles, but in some cases sidewalks or bike paths are unavailable)*
- *difficult (sidewalks and bike paths do not connect to transit stops or stations, so access by bicycle or foot is potentially unsafe)*
- *don't know*

What do you feel would contribute most to increasing ridership in your area?

- *increased subsidies*
- *more frequent or more reliable service*
- *new equipment/infrastructure*
- *modifications to the built environment*

Have you ever heard of the practice of transit agencies investing in land development?

- ○ *yes, I have heard of the practice*
- ○ *yes, my agency actually engages in land development*
- ○ *no, I have never heard of the practice*

Do you think that investing in land development (in projects which may involve your agency's participation in the actual development process) is feasible for your agency?

- ○ *yes*
- ○ *no (please specify your reasons in the box below)*
- ○ *don't know*

Reasons for answering "no" (ie, limited land development expertise, lack of funding, etc)

Would your agency be able to invest in real estate (with no development necessary)?

- ○ *yes*
- ○ *no (please specify your reasons in the box below)*
- ○ *don't know*

Reasons for answering "no" (ie, lack of funding, lack of personnel, etc)

Is your agency willing to invest in real estate (with no development involved)?

- ☐ *yes, without assistance*
- ☐ *yes, with assistance*
- ☐ *no*
- ☐ *don't know*

Would the provision of grants or subsidies *for the purchase of land* affect your agency's decision to invest in land development?

- ○ *yes*
- ○ *no*
- ○ *don't know*

Would the provision of grants or subsidies *for the planning or construction of a development* affect your agency's decision to invest in land development?

- ○ *yes*
- ○ *no*
- ○ *don't know*

Would the availability of land developer expertise in the development process affect your agency's decision to invest in land development?

- *yes*
- *no*
- *don't know*

What do you think about transit agencies investing in land development in general?

- *transit companies should invest in land development whenever possible*
- *transit companies should invest in land development projects that have a potentially high impact on ridership*
- *transit companies should only invest in land development projects that have small risk*
- *transit companies should not invest in land development*
- *don't know*

Other, please specify

In what kinds of developments, if any, would your agency be willing to invest? Please check all that apply.

- [ ] *residential developments*
- [ ] *commercial developments*
- [ ] *industrial developments*
- [ ] *mixed land use developments*
- [ ] *none*

What other factors, if any, would encourage your agency to invest in land development?

What other factors, if any, would discourage your agency from investing in land development?

According to Cervero, Ferrell, and Murphy (2002), the three levels of transit company involvement in land development are 1) proactivism, or initiating and leading the development process, 2) coordination and facilitation, or participating in a consulting capacity, and 3) inactivity, or non-participation. What role does your agency believe it <u>should</u> have in land development?

- *proactivism*
- *coordination and facilitation*
- *inactivity*

What is the current role your agency takes regarding land development?

- ○ *proactivism*
- ○ *coordination and facilitation*
- ○ *inactivity*
- ○ *don't know*

What barriers prevent your agency from being more involved in new developments? Check all that apply.

- ☐ *financial state of the agency*
- ☐ *lack of coordination with other companies/agencies*
- ☐ *lack of development opportunities in the area*
- ☐ *lack of trained personnel*
- ☐ *belief that transit should not participate in land development*
- ☐ *previous unawareness that transit can invest in land development*
- ☐ *no barriers*

In your opinion, which barrier to transit agency involvement in land development has the biggest influence on your agency?

- ○ *financial state of the agency*
- ○ *lack of coordination with other companies/agencies*
- ○ *lack of development opportunities in the area*
- ○ *lack of trained personnel*
- ○ *belief that transit should not participate in land development*
- ○ *previous unawareness that transit can invest in land development*
- ○ *none*

What factors encourage your agency to invest or participate in land development? Check all that apply.

- ☐ *financial state of the agency*
- ☐ *strong coordination with other companies/agencies*
- ☐ *presence of development opportunities in the area*
- ☐ *trained personnel available*
- ☐ *belief in transit's role in land development*

What is the biggest factor that encourages your agency to invest or participate in land development?

- ○ *financial state of the agency*
- ○ *strong coordination with other companies/agencies*
- ○ *presence of development opportunities in the area*
- ○ *trained personnel available*
- ○ *belief in transit's role in land development*

What is your perception of the ability of your local government to financially support the initial infrastructure costs (such as those associated with utilities) of large-scale, new commercial developments?

- *completely unable*
- *able for a limited number of projects*
- *very able*
- *don't know*

Some zoning policies can encourage low-density urban sprawl that may be discouraging to transit use. What is the atmosphere of zoning policies in your area?

- *discouraging to dense, mixed land use*
- *allowing dense, mixed land use in certain areas*
- *encouraging to dense, mixed land use in all areas*
- *don't know*

How easily can the zoning and land use regulations in your area be changed or modified?

- *changes/modifications are impossible*
- *changes/modifications can be made with great difficulty*
- *changes/modifications are possible with moderate effort*
- *changes/modifications are easily made*
- *don't know*

What is the availability of parking in the commercial and business districts of the area your agency serves?

- *plenty of parking, and most of it is free*
- *plenty of parking, and most of it is paid*
- *plenty of parking, with a near-even split of free and paid*
- *limited parking, and most of it is free*
- *limited parking, and most of it is paid*
- *limited parking, with a near-even split of free and paid*
- *very little parking, free or paid*
- *don't know*

Is your area subject to trip reduction ordinances?

- *yes*
- *no*
- *don't know*

In your opinion, would the participation of transit agencies in land development in your region receive strong public support in the planning and construction stages of a mixed-use new development?

- *yes*
- *no*

Referring to the previous question, assuming the developments meet all of the objectives they are designed to meet, would the public in your area be willing to relocate to the development and patronize public transit?

- *yes*
- *no*

If your agency was to receive direct financial subsidies for capital improvements, how would your agency spend them? Check all that apply.

- [ ] *equipment upgrades*
- [ ] *line extensions*
- [ ] *station/stop improvements*

What form of subsidies does your agency currently receive? Please check all that apply

- [ ] *grants for transit-oriented development activities such as land purchase and planning costs*
- [ ] *direct financial subsidies for operating costs*
- [ ] *direct financial subsidies for capital improvements*
- [ ] *none*
- [ ] *don't know*

Other: please specify

What form of subsidies would your agency most like to receive? Please check all that apply.

- [ ] *grants for transit-oriented development activities such as land purchase and planning costs*
- [ ] *direct financial subsidies for operating costs*
- [ ] *direct financial subsidies for capital improvements*
- [ ] *none*
- [ ] *don't know*

Other: please specify

What is the spatial potential for large-scale new residential developments near transit in the areas your agency serves?

- *no room whatsoever*
- *room for infill development only*
- *some currently undeveloped land in the urban area*
- *an abundance of undeveloped land in the urban area*
- *don't know*

What is the spatial potential for large-scale new commercial developments near transit in the areas your agency serves?

- *no room whatsoever*
- *room for infill development only*
- *some currently undeveloped land in the urban area*
- *an abundance of undeveloped land in the urban area*
- *don't know*

What is the availability of investments and loans from banks or other companies for large-scale new residential developments in your area?

- *companies and banks are unwilling to invest*
- *companies and banks are willing to invest in projects with low risk*
- *companies and banks are willing to invest in projects with moderate risk*
- *companies and banks are willing to invest in higher-risk projects*
- *don't know*

What is the availability of investments and loans from banks or other companies for large-scale new commercial developments in your area?

- *companies and banks are unwilling to invest*
- *companies and banks are willing to invest in projects with low risk*
- *companies and banks are willing to invest in projects with moderate risk*
- *companies and banks are willing to invest in higher-risk projects*
- *don't know*

What is the demand for new residential developments in your area?

- *no demand at all*
- *very little demand*
- *moderate demand*
- *high demand*
- *don't know*

What is the demand for new commercial developments in your area?

- *no demand at all*
- *very little demand*
- *moderate demand*
- *high demand*
- *don't know*

Questions About Your Area and Your Agency

How many lines does your agency have? Please specify

[ ]

What modes does your agency offer? Check all that apply.

- [ ] *rail*
- [ ] *bus*

What percentage of your operating costs are covered by revenues from fares?

- [ ] *0-20 %*
- [ ] *20-40%*
- [ ] *40-60%*
- [ ] *60-80%*
- [ ] *80-100%*

What is the current state of ridership in the area your agency serves?

- ○ *none (transit not available)*
- ○ *all riders are transit-dependent*
- ○ *some riders are transit-dependent, and others are "choice" riders*
- ○ *more of the riders are "choice" riders than transit-dependent riders*
- ○ *very strong: transit is a significant portion of the modal split*

Where is your region located?

- ○ *Northeast US*
- ○ *Mid-Atlantic US*
- ○ *Central US*
- ○ *Southeast (including Florida) US*
- ○ *Southwest US*
- ○ *Pacific (US)*
- ○ *Northwest (US)*
- ○ *international*

other, please specify

What is the population of the area your agency serves?

- ○ *less than 100,000*
- ○ *100,000 to 250,000*
- ○ *250,000 to 500,000*
- ○ *500,000 to 750,000*
- ○ *750,000 to 1 million*
- ○ *1 million to 2 million*
- ○ *2 million to 3 million*
- ○ *3 million to 4 million*
- ○ *4 or more million*

For how long has your agency been in operation?

- *1-10 years*
- *11-20 years*
- *21-40 years*
- *41-60 years*
- *61-80 years*
- *more than 80 years*

Which of the following best describes the year-to-year stability of transit demand in the area your agency serves over the last 10 years?

- *unstable*
- *moderately stable*
- *stable*
- *don't know*

Does a lack of stability make transportation planning in your region difficult?

- *no*
- *yes*

Role of Transit Service Providers in Land Development

Questions for Land Developers

Which of the following do you perceive would be the most significant outcome to your community from transit agencies participating in land development?

- *reduced congestion*
- *increased air quality*
- *increased public safety*
- *increased economic activity*
- *increased transit ridership*
- *revenue from land sales and leases*

Have you ever heard of the practice of transit agencies investing in land development?

- *yes, I have heard of the practice*
- *no, I have never heard of the practice*

What do you think about transit agencies investing in land development in general?

- *transit companies should invest in land development whenever possible*
- *transit companies should invest in land development projects that clearly involve transit interests*
- *transit companies should not invest in land development*
- *don't know*

Other, please specify

What other factors, if any, do you think would encourage transit agencies in your area to invest in land development?

What other factors, if any, do you think would discourage transit agencies in your area from investing in land development?

What is the spatial potential for large-scale new residential developments near transit in your area?

- *no room whatsoever*
- *room for infill development only*
- *some currently undeveloped land in the urban area*
- *an abundance of undeveloped land in the urban area*
- *don't know*

What is the spatial potential for large-scale new commercial developments near transit in your area?

- *no room whatsoever*
- *room for infill development only*
- *some currently undeveloped land in the urban area*
- *an abundance of undeveloped land in the urban area*
- *don't know*

What is the availability of investments and loans from banks or other companies for large-scale new residential developments in your area?

- *companies and banks are unwilling to invest*
- *companies and banks are willing to invest in projects with low risk*
- *companies and banks are willing to invest in projects with moderate risk*
- *companies and banks are willing to invest in higher-risk projects*
- *don't know*

What is the availability of investments and loans from banks or other companies for large-scale new commercial developments in your area?

- *companies and banks are unwilling to invest*
- *companies and banks are willing to invest in projects with low risk*
- *companies and banks are willing to invest in projects with moderate risk*
- *companies and banks are willing to invest in higher-risk projects*
- *don't know*

Some zoning policies can encourage low-density urban sprawl that may discourage transit use. Rate the atmosphere of zoning policies in your area.

- *discouraging dense, mixed land use*
- *allowing dense, mixed land use in certain areas*
- *encouraging dense, mixed land use in all areas*
- *don't know*

According to Cervero, Ferrell, and Murphy (2002), the three levels of transit company involvement in land development are: 1) proactivism, or initiating and leading the development process, 2) coordination and facilitation, or participating in a consulting capacity, and 3) inactivity, or non-participation. What levels of involvement do the transit companies in your area currently take in land development?

- *proactivism*
- *coordination and facilitation*
- *inactivity*
- *don't know*

other, please specify

What factors, if any, do you feel contribute to this inactivity? Please specify

What level would you as a land developer most like to see transit companies take in land development?

- *proactivism*
- *coordination and facilitation*
- *inactivity*

Does your company actively seek transit company input in the planning stages of new developments?

- *yes, we seek communication with transit agencies*
- *we communicate through another department (such as a city planning department)*
- *no, we wait for them to open communication with us*
- *don't know*

Do local regulations require that you seek transit company input in developments?

- *yes*
- *no*
- *don't know*

In what ways, if any, would your company be willing to further transit interests in new development? Please Check all that apply

- [ ] *designing the built environment to encourage transit use*
- [ ] *helping fund improvements to transit services in the area of new developments*
- [ ] *providing necessary infrastructure within the development for transit stops and stations*
- [ ] *unwilling to help*

What factors, if any, make your agency unwilling to further transit interests in your new development? Please specify the factors or write "none" if not applicable.

In your opinion, would the participation of transit agencies in land development in mixed-use developments in your region receive strong public support in the planning and construction stages?

- *yes*
- *no*

Do you think the public in your area would be willing to relocate to a transit-friendly, mixed-use development and patronize public transit?

- *yes*
- *no*

Rate the demand for new residential developments in your area.

- *no demand*
- *very little demand*
- *moderate demand*
- *high demand*
- *don't know*

What is the spatial potential for large-scale new residential developments near transit in the areas your agency serves?

- *no room whatsoever*
- *room for infill development only*
- *some currently undeveloped land in the urban area*
- *an abundance of undeveloped land in the urban area*
- *don't know*

Rate the demand for new commercial developments in your area.

- *no demand*
- *very little demand*
- *moderate demand*
- *high demand*
- *don't know*

What is the current state of transit ridership in your area?

- *none (transit not available)*
- *all riders are transit-dependent*
- *some riders are transit-dependent, and others are "choice" riders*
- *more of the riders are "choice" riders than transit-dependent riders*
- *transit is a significant portion of the modal split*

Role of Transit Service Providers in Land Development

Questions for Government Planning Agencies

Which of the following do you perceive would be the most significant outcome to your community from transit agency participating in land development?

- *reduced congestion*
- *increased air quality*
- *increased public safety*
- *increased economic activity*
- *increased transit ridership*
- *revenue from land sales and leases*

In your opinion, which of the following has the most impact on transit ridership in your area?

- *the availability of subsidies for service improvements*
- *the most up-to-date equipment*
- *more frequent or more reliable service*
- *the supporting built environment (sidewalks, transit stops and stations, etc)*

If there is another factor, please specify below

According to Cervero, Ferrell, and Murphy (2002), the three levels of transit company involvement in land development are: 1) proactivism, or initiating and leading the development process, 2) coordination and facilitation, or participating in a consulting capacity, and 3) inactivity, or non-participation. What levels of involvement do the transit companies in your area <u>currently</u> take in land development?

- *proactivism*
- *coordination and facilitation*
- *inactivity*
- *don't know*

What level would you as a government official most like to see transit companies take in land development?

- *proactivism*
- *coordination and facilitation*
- *inactivity*

Have you ever heard of the practice of transit agencies investing in land development?

- *yes, I have heard of the practice*
- *no, I have never heard of the practice*

Do you think that investing in land development would be feasible for transit companies in your area?

- *yes*
- *no (please specify reasons in the box below)*
- *don't know*

Reasons for answering "no" (ie, lack of funding, lack of available personnel, etc)

What do you think about transit agencies investing in land development in general?

- *transit companies should invest in land development whenever possible*
- *transit companies should invest in land development projects that have a potentially high impact on ridership*
- *transit companies should only invest in land development projects that have small risk*
- *transit companies should not invest in land development*
- *don't know*

Other, please specify

Do you think transit agencies in your area would be able and willing to invest in real estate (with no development necessary)?

- *yes*
- *no (Please specify reasons below)*
- *don't know*

Reasons for answering "no" (ie, lack of funding, lack of personnel, lack of land development expertise, etc)

What other factors, if any, do you feel would encourage transit companies in your area to invest in land development?

What factors, if any, do you feel would discourage transit companies in your area from investing in land development?

Is your local government able to financially support the initial infrastructure costs (such as costs associated with utilities) of new developments?

- *unable*
- *able for a limited number of projects*
- *very able and willing*
- *don't know*

In your opinion, would the participation of transit agencies in land development in your region receive strong public support in the planning and construction stages of new, mixed-use developments?

- *yes*
- *no*

Do you think the public in your area would be willing to relocate to a transit-friendly, mixed-use development and patronize public transit?

- *yes*
- *no*

To what extent does communication between governmental agencies and transit companies exist in your area?

- *no communication*
- *minimal communication at infrequent intervals*
- *minimal communication at frequent intervals*
- *moderate communication at infrequent intervals*
- *moderate communication at frequent intervals*
- *strong communication at infrequent intervals*
- *strong communication at frequent intervals*
- *don't know*

Some zoning policies can encourage low-density urban sprawl that may discourage transit use. Rate the atmosphere of zoning policies in your jurisdiction.

- *discouraging dense, mixed land use*
- *allowing dense, mixed land use in some areas*
- *encouraging dense, mixed land use in all areas*
- *don't know*

How easily can the zoning and land use regulations in your jurisdiction be changed or modified?

- *changes/modifications are impossible*
- *changes/modifications can be made with great difficulty*
- *changes/modifications are possible with moderate effort*
- *changes/modifications are easily made*
- *don't know*

What is the availability of parking in the commercial or business districts of your city?

- *plenty of parking, and most of it is free*
- *plenty of parking, and most of it is paid*
- *plenty of parking, with a near-even split of free and paid*
- *limited parking, and most of it is free*
- *limited parking, and most of it is paid*
- *limited parking, with a near-even split of free and paid*
- *very little parking, free or paid*
- *don't know*

Is your area subject to trip reduction ordinances?

- *yes*
- *no*
- *don't know*

What form of subsidies does your agency feel would most benefit transit companies? Please check all that apply.

- [ ] *grants for transit-oriented development activities such as land purchase and planning costs*
- [ ] *direct financial subsidies for operating costs*
- [ ] *direct financial subsidies for capital improvements*
- [ ] *none*
- [ ] *don't know*

Other: please specify

What form of subsidies do transit agencies in your jurisdiction currently receive?

- [ ] *grants for transit-oriented development activities such as land purchase and planning costs*
- [ ] *direct financial subsidies for operating costs*
- [ ] *direct financial subsidies for capital improvements*
- [ ] *none*
- [ ] *don't know*

Other: please specify

Questions About Your Area and Transit

What is the current state of transit ridership in your jurisdiction?

- *none (transit not available)*
- *all riders are transit-dependent*
- *some riders are transit-dependent, and others are "choice" riders*
- *more of the riders are "choice" riders than transit-dependent riders*
- *transit is a significant portion of the modal split*

What percentage of transit company *operating* costs are covered by government subsidies in your area?

- *0-20%*
- *20-40%*
- *40-60%*
- *60-80%*
- *80-100%*
- *don't know*

How many transit companies (providing heavy rail, light rail, or bus) serve your area?

- *0*
- *1-3*
- *4-6*
- *7-9*

Where is your region located?

- *Northeast US*
- *Mid-Atlantic US*
- *Central US*
- *Southeast (including Florida) US*
- *Southwest US*
- *Pacific (US)*
- *Northwest (US)*
- *international*

What is the population of your jurisdiction?

- *less than 100,000*
- *100,000 to 250,000*
- *250,000 to 500,000*
- *500,000 to 750,000*
- *750,000 to 1 million*
- *1 million to 2 million*
- *2 million to 3 million*
- *3 million to 4 million*
- *4 or more million*