

Success by Any Other Name Would Smell as Sweet – Different Perspectives on Success in Public Transport Systems

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1 Introduction

The issue of what it is that makes a public transport system successful is very important. World-wide there are many examples of what most would describe as unsuccessful public transport systems, and still less significant examples of what could be called successful systems. Significant research has occurred in attempting to establish the factors influencing the success of one public transport system over another and the range of success factors in public transport systems. While it is true that conventional success measures adopt different objectives than unconventional measures, and depending on one's objective they can all be correct. What such a view misses is the way in which more conventional indicators of success are commonly portrayed, and therefore taken up by the public at large. Conventional indicators can be used to substantiate claims that a public transport system is unsuccessful because they have failed in achieving a particular indicator, without any discussion or examination of the underlying reasons behind such apparent 'failure'. As the research for this paper has found, simply stating that a public transport system is unsuccessful because it doesn't achieve a set indicator rarely means that the public transport system in question is unsuccessful, more often it means that there are other factors at play that influence the success or other wise of the system.

This paper, summarised from the author's Masters Thesis, looks at the meaning of success in public transport systems and the literature that has attempted to define such a concept, what factors influence success and its inverse. The paper explores the public's desire for personal mobility and then examines the available statistics taken from the four cities of Vancouver, Portland, San Diego and San Jose used as case studies for the larger Masters Thesis research.

2 Success in Public Transport Systems

Numerous factors have contributed to the declining role of public transport in most cities, and the upward trend of automobile use, especially for the peak period work commute. In Europe in particular, the deregulation of the transit sector has been a significant factor behind the decline in patronage, in addition to government disinvestment leaving the infrastructure straining to cope (Cervero 1998). The economic and spatial trends of more recent times, however, have had more of an adverse affect on patronage levels than government disinvestment alone (Cervero 1998).

Issues related to rising personal incomes and car ownership, declining real-dollar costs for motoring, free and abundant parking and the steady spreading of cities has contributed to the dwindling of public transport's market share world-wide. Naturally these aren't the only issues that have influenced the decline in patronage numbers in public transport systems. Low-density development fuelled by inaccurate and inefficient price signals from governments, the changing nature of personal travel needs and the requirement of public transport needing to match, if not better, the adaptability and convenience of the private vehicle have all been influential. Fortunately there have been some public transport systems that have changed the downward trend of patronage and market share. Cervero (1998) maintains that the feature that is common to them all, namely adaptability, has been achieved by careful and judicious *investment, reinvestment, organising, reorganising, inventing and reinventing*.

Cox (1996) asserts that public transport authorities have long celebrated public transport's theoretical ability of achieving the significant public policy objectives of reducing traffic congestion, air pollution and energy consumption. However, for Cox the results have fallen short of the theory.

'The failure to deliver on these promises arises from two factors – over-selling of public transport's capabilities and failure to employ the most cost effective approaches. If public transport is to successfully compete for public funding the theoretical claims must be more realistic and resources must be managed more effectively.'

Cox (1996) establishes two main purposes of public transport which are:

'to serve a social need by enabling the mobility of the transport disadvantaged and to serve an environmental need by providing an alternative to the automobile and reducing traffic congestion, air pollution and energy consumption'.

He introduces two very common performance indicators in public transport systems, that is, effectiveness and efficiency (Cox 1996). Ultimately, however, it is possible that success factors for public transport will be based on much less economically focused criteria, and more on harder to define indicators like liveability, attractiveness and public perception. Naturally the ongoing importance of key indicators such as patronage numbers, ticket revenue, and safety will still be important factors for the success or otherwise of a public transport system, yet as empirical and anecdotal evidence would suggest what works for one transport system does not necessarily work for another (Hoppe 1993; Newman and Kenworthy 1999).

1.1 What is meant by the term success?

There is a general assertion that public transport needs to be financially viable to justify its development and ongoing maintenance (which is a judgement commonly levelled at public transport) (Cox and Love 1993). Yet the same judgement is rarely levelled at defence, roads or any other public good. Sometimes, as in the case of national defence, there's a very good reason why the government needs to provide such a service. In cases where it is in the government's best interests, because of issues of national security or social equity, public goods are provided by the government to ensure that all citizens have equitable access and that the service occurs in the first place if there is no market incentive to provide it (Rosen 2002)¹. So therefore the question remains, why do some commentators, governments and economists believe that public transport needs to satisfy the self-funding, financially viable criteria to be deemed successful? Surely there can be other, equally as important factors, which make a public transport system successful, especially if society accepts that a public transport system is vital and needs to be publicly funded²?

More particularly, what is meant by the term 'success' when considering a public transport system? A number of researchers have attempted to define what success might mean, in relation to the performance of public transport systems, using a range of academic

¹ An incentive being financial or otherwise.

² The issue of market failure is well debated in economic circles, the issue being how do you judge what is the most economical use of limited resources that the government has at hand? Publicly provided passenger transport may not be the best use of those resources as judged under certain rational criteria. The complexity with public transport and the judging of it's worthiness for public funding is that its provision is generally aimed at assisting people who may not always find public transport accessible. Fortunately in Public Economics public goods are called such because the market generally has no incentive to provide them to consumers, and so the government is obliged to step in to what is usually described as a 'market failure' to provide the service to its citizens.

frameworks. Ultimately, the analysis usually begins and ends at a purely quantitative investigation of just how a system might be performing against certain rigid criteria. More infrequently it seems, are researchers choosing to evaluate a system on both quantitative and qualitative criteria.

1.1.1 Defining and measuring success

There are many ways to illustrate success in public transport systems. In general it is meant to convey that a particular public transport system may be rated as successful because it attains a certain key indicator that is meant to demonstrate its achievement or otherwise. Many of these indicators are based on restrictive quantitative measurements, such as those which Cox (1993) and others have used. Such indicators may include total ridership numbers, the level of subsidy public transport requires and how much revenue it takes, or more qualitatively the level to which land use and urban development have been integrated into public transport systems. There are many researchers that would argue the merits of each of these indicators (Newman and Kenworthy 1999; Cox and Love 1993).

Schiller and Kenworthy (1999) in particular, highlight Portland as having a model to emulate on growth management and transportation planning. Yet, although there are some positive trends evident in Portland, such as public transport-led development and a revitalised central and inner city area, on the whole the region remains auto dependent and a low user of public transport per capita. Cox and Love (1993) on the other hand emphasise that unless ridership numbers are sufficient enough to render the system economically viable then it must be deemed a failure, as the public money (sometimes large subsidies) could be better spent elsewhere, as US cities are inherently suited to the private vehicle. While Litman (2004) maintains that there are many ways that a public transport system's effectiveness can be evaluated, and that in part it relies on the way in which communities would like their public transport system to run.

Cox (1996) suggests three main ways to assess the effectiveness of public transport – the first using public transport market share or public transport work trip market share and subsidy per passenger. Unfortunately this type of methodology assumes that public transport is obliged to have the majority of the task market share to be considered successful and that any subsidy of a public service (whether publicly or privately owned) is a measure of ineffectiveness.

There are a number of ways in which success in public transport has been defined in the literature, most however centre on the fulfilment of expectations from the initial investment (See Walmsley 1992; and Fourace et. al. 1990). Babalik-Sutcliffe (2002) identifies five main objectives that appear to be common across most new developments: attaining a high patronage, being cost-effective, increasing total public transport usage, helping to reduce car traffic and having a positive impact on land-use and urban growth patterns. Sub-categorised beneath the last two objectives was the aim of achieving reductions in growth of car usage, preventing or at least relieving traffic congestion, reducing air pollution, helping to stimulate development in the CBDs and in the declining areas that might be under regeneration, and helping to change urban growth patterns from car-oriented to more public transport-friendly forms.

These are all lofty aims that for the most part rely on the integration and co-operation from many other institutions, business groups, citizens and public transport users. To think that these objectives can be achieved without the concerted, and purposively planned, collaboration from all sectors of the city is foolhardy to say the least. What this research unfortunately highlights is that for many new public transport developments, such purposeful planning had either not been done at all, or has at best been haphazard and done without any real thought.

2.1 Factors that influence the potential for success

There are a number of other factors that have been suggested as having an influence on the level of success of public transport systems. These include urban density, car ownership and usage levels, parking policies in congested and city CBD areas, public transport availability, urban sprawl, urban land form, privatisation or public ownership of a system, and the level of new road development (Halden 2003). In addition to those hard factors that deal with economic issues like time and monetary costs of travel, the soft factors are travel information availability and the complementary factors being the need to carry heavy loads or young children, weather and lifestyle constraints (Halcrow 2002 cited in SESR 2003). Mees (2000) describes urban transport policy as a vexing issue of the last decade or more:

“Urban public transport is, almost everyone agrees, a Good Thing. We all wish more people would use it, to reduce pollution and traffic congestion, and save on the financial and environmental cost of roads and car parks. If public transport was better, our cities would also be more equitable – people without cars would be less like second-class citizens”.

There is ample research that has explored and found a certain relationship between rising incomes and car-ownership and use, especially in developed countries (although more recently developing countries are following very quickly behind this trend). Increasing traffic volumes have generally been accompanied by decreasing public transport patronage. The limitations of relying solely on improved public transport can also be seen in the experience of Zurich, widely touted as the world’s most successful public transport system, which despite having one of the highest (and still-increasing) patronage rates in the world, has not been able to reduce traffic levels. The lesson here may be that an excellent public transport system has to be supported by direct measures aimed at restraining traffic levels (See Mees 2000; Cox and Love 1993 and Newman and Kenworthy 1999).

Mees (2000) recognises that public transport can’t solve all the problems of an auto-dominated city. Just calling for public transport is not a sufficient response to the problems of environmental sustainability, equity issues or problems with congestion. It is unlikely that improved public transport by itself would reduce traffic levels, because of the concept of ‘suppressed demand’. Suburbanisation remains the most popular explanation for the ongoing issues faced by public transport. The more frequently dispersed city patterns and the consequent dispersed journey patterns tend not to produce the concentrated flows of passengers required to support conventional public transport. Most of the current suburban travel is cross-suburban and this makes it inconvenient for public transport to serve. Mees (2000) also notes that dramatic technological change is unlikely to alter such a situation anytime soon. It is well known that the forms of public transport that favour developed cities currently are all products of the 19th century, and were more or less developed to their current forms by 1920 (Mees 2000).

Litman (2004) suggests that success of public transport can be enhanced by a number of strategies in support of investment. They include:

- Giving public transport priority over other vehicles through managed lanes, traffic signal pre-emption, special intersection design, and preferred loading and parking locations;
- Parking management through allowing ‘parking cash out’ (where employees who receive free parking have the option of choosing cash or public transport subsidy instead), ‘unbundling’ (building renters only pay for the amount of parking they actually want), and more flexible parking requirements that allow developers to supply less parking where appropriate.
- Commute Trip Reduction Programs (CTR) ultimately give commuters resources and incentives to reduce their automobile trips.

- Campus and school transport management programs that offer co-ordinated efforts to improve transportation options and reduce trips at colleges, universities and other campus facilities;
- Marketing and user information to assess the public approval and opinion, enabling a more accurate provision of transport;
- Non-motorised improvements through improving the infrastructure such as side-walks, correcting road-ways hazards and enhancing bike storage and parking;
- Transit-oriented development which designs communities with maximum access to public transport and good walking and cycling conditions; and
- Least cost planning – current transportation planning practices are biased in many ways towards highways and parking investment over public transport and more neutral planning allows for increased efficiency and equity.

The (Halden 2003) highlights a number of time and cost factors that ensure walking, cycling and public transport are more attractive:

- The quality of the waiting environment at bus stops and rail stations;
- Improved security with CCTV and reduced vandalism;
- Electronic and printed information at bus stops;
- Larger station car parks;
- Enforcement of bus lanes to improve bus travel times;
- Reallocation of road space to give more priority to pedestrians; and
- Better integration between modes covering physical interchanges, timetables, information and ticketing.

1.2 Policies and practices that influence success

Babalik-Sutcliffe (2002) observes that in regards to urban areas there were some factors that had vital impacts on the level of success experienced by a public transport system. These include the vitality of the CBD, the urban form, the level of public transport usage and the economic profile of the population it was intended to serve (See also Newman and Kenworthy 1999, Cox 2003, Litman 2004, Cervero 1998 and Bernick 1997). In some ways the urban form factors, and the public policy frameworks that support them, are simply common sense. What is the economic sense of building a public transport system that isn't integrated with the surrounding trip generating urban facilities and dwellings? If a government has made the immensely politically and socially weighted decision of upgrading or developing a new public transport system, it would seem obvious to then ensure that it is, if not immediately, certainly successful in the long term. Or at least that there are few public policy, planning or infrastructure barriers that mean its ultimate success is at best a gamble, yet the research suggests that this has been done many times over (Babalik-Sutcliffe 2002).

Not surprisingly Babalik-Sutcliffe's (2002) research also reveals that cities that have developed along radial corridors with a high density of expansion are suited to urban rail systems, a concept that many other researchers have also discovered (See Newman and Kenworthy 1999 also). Connected to this is the evidence of existing high patronage levels being a significant determinant in the future patronage levels of any development. Vancouver is cited as an example of a city that experiences high levels of public transport patronage coupled with high car ownership and was found to have a supportive regional/metropolitan government that made a significant impact on the success of the new SkyTrain development (Cervero 1986; and Schimek 1996). The local economic conditions can also have a surprising effect on the level of patronage of any new public transport development. In fact the local

economy is more important than the wider economic and market trends of the city or region. An economically vibrant local area will ensure the ongoing generation of trips on a new development (Babalik-Sutcliffe 2002).

1.2.1 Integrated urban planning

Also not surprising are Babalik-Sutcliffe's (2002) findings regarding the wider planning implications on the success of a new public transport system. When a system was integrated with the local urban projects, like urban renewal programs or the local bus routes, this was found to have a greater effect on the likelihood of the new public transport development being successful. Ensuring that the bus route integrated into the existing rail system significantly improved accessibility further increased the potential success of the new public transport system.

Providing parking at stations was also seen to have an impact on the success of a new rail system, as it encouraged car drivers to 'park and ride'. There was some friction between providing ample parking to attract riders and the development of car parks coming at the expense of other types of development in the future (Babalik-Sutcliffe 2002). It was also found that more thought needed to go into other planning factors such as design features like technology, the level of segregation, and grade separation. On the whole these features were found to be dependant on the surrounding urban area. Full segregation and driver automation did not appear to work well in areas experiencing high crime rates; as such measures merely perpetuated the behaviour. Other related operating policies were also found to have a significant effect on the ongoing success of a public transport system. For instance, policies that provide a frequent service, the introduction of 'smart' travel cards, free transfers to other modes, free travel in certain parts of the system, effective marketing and advertising and adequate security at stations and car parks all assisted in attracting more riders to the system (Babalik-Sutcliffe 2002).

Obviously having a supportive urban planning environment goes a long way in ensuring a better chance of success of any new public transport development. In particular it was seen that those local governments and municipalities that adapted their particular urban development plans to integrate effectively with the new public transport systems experienced much better patronage as a result. Such as by offering incentives for transit-oriented development, encouraging the initiation of joint-development projects, locating public developments at stations, increasing the 'pedestrianisation' of city centre streets, instigating city centre redevelopment projects, and developing urban renewal projects in declining areas along the new public transport route (Babalik-Sutcliffe 2002).

Bernick and Cervero (1997) cite other important planning policies such as density bonuses that serve to induce higher density development, especially public transport stations; park and ride constraints that encourage high-rise dwellings and retail lots instead of blocks of parking, and restrict parking to major terminal locations; transferable development rights that serve to intensify development around station precincts; and supplemental land acquisitions that encourage local governments to be entrepreneurial in leveraging large-scale public works projects.

1.2.2 Supportive public transport system planning

It would seem obvious to also ensure that the public transport system was planned and implemented in such a way as to encourage people to use it. Issues of frequency, reliability, and convenient drop off sites, better connections and discount tickets were found to be features that would encourage over 40% of car commuters to public transport, in a recent research project (Kingham et. al. 2001). Some important issues that the Kingham et al. (2001) research highlights is that there is a significant willingness among people to shift modes to public transport if the conditions are right, yet the main impediment to this potential shift is that most people live long distances from their place of work.

It is well known that locating housing in close proximity to public transport stations, and especially in conjunction with the upgrading of the railway lines or stations tends to lead to an increase in patronage of the modes of public transport available in that area. However, it is not enough for the public transport station to merely exist. For it have any chance of increasing patronage, a range of supportive hard and soft policies are required. Any development around a public transport station needs to also incorporate other policies such as mobility management programs with the local government, housing developers and the public transport providers (Heilemann and Kemming 2002).

3.2 Factors that limit success

Whitelegg and Haq eds. (2003) make a persuasive argument against policies that serve to limit the success of public transport and that have caused current transport problems. Such policies include:

- Encouraging as many people as possible to make as many journeys as possible by car on the assumption that governments will always find the cash to build the roads, tunnels, flyovers and bridges;
- Providing as much government subsidy and encouragement as possible to car-based transport through loans, grants, road building, cheap fuel and every other expenditure that can be diverted into supporting this system (health care, policing and the courts system);
- Ignoring the enormous advantages of walking and cycling for conferring health benefits, achieving accessibility at low cost and enhancing the aesthetics and ethics of the city;
- Trying to ensure that children get as little exercise as possible and therefore become more unhealthy as a result of being carried everywhere in cars;
- Encouraging as much use as possible of very large cars (ideally up to 2 tonnes in weight) by one person only;
- Encouraging as many cars as possible to fill up the available road space (always in short supply in cities) so that these cars disrupt buses, making them an unattractive option and making life very difficult for pedestrians and cyclists;
- Encouraging as many cars as possible to pollute the air, increase noise levels and kill children;
- Donating as much land as possible to keeping this system going, especially if the land is needed for food production;
- Always ensuring that wealthy groups and middle class groups are well looked after with enough road space, parking and public expenditure; and
- Always ensuring that pedestrians are inconvenienced as much as possible when trying to cross roads, making very sure that cars are never delayed by even a couple of seconds in order to give pedestrians easy road crossing possibilities.

While such policies seem fanciful and obviously over dramatised, the authors argue that almost every country in the world has managed inadvertently to achieve some or all of these policy objectives.

1.2.3 The consequences of underpriced vehicle ownership and unlimited use

The culture of the private vehicle has been blamed for a number of local and global environmental ills, namely low-density sprawl, premature deaths from accidents and air pollution, the migration of people from inner-city neighbourhoods, social isolation and class segregation, depletion of fossil fuels, climate change, noise pollution and the exploitation of Third World economies. While this is a long and seemingly exhaustive list, it doesn't go any

length in describing how such consequences have occurred. As cities have matured and progressed, so have their inhabitants' need for fast, economical and ultimately convenient personal transport. Just as a gun can't shoot on its own, and is therefore not the culprit of rising crime rates in and of itself; so too the personal vehicle is not the source of all the evils of modern city life. Rather there are numerous reasons for the decline in patronage of public transport and the rise in vehicle use, and the increase in the consequences of those events. It is not only rising personal wealth and mobility that have fuelled the increase in vehicle use; more importantly, government policies have aided and abetted such changes (these have been mentioned previously and include such policies as subsidies, indirect or otherwise, for large-lot living, and under priced car travel) (Cervero 1998).

In North America alone, 90% of households own a personal vehicle and use it for most of their travel, and there are now more vehicles than people with licences to drive them. Such unlimited ownership and use will eventually, if it hasn't already, lead to a saturation point. Litman (2004) believes America has already reached that point. Congestion has now become for most North Americans (and many other Western and Asian countries) a fact of life and an irritating but necessary part of owning and driving a vehicle. Yet because there is both a lack of political will and popular support for any measures that would solve such problems, such as congestion pricing, general road pricing, major public transport investment, transport demand programs or even major urban highway capacity programs, people are now accepting congestion as a matter of course. In response they spend great amounts of energy, time and money incorporating the avoidance of peak-period driving, and an increasing assortment of creature comfort into their cars (Litman in Whitelegg and Haq eds. 2003; and Cervero date)³.

1.2.4 Unsupportive public policies

Litman (2004) highlights the public policies in North America (reflected in most Western countries) that are ultimately unsupportive of a public transport system and that, increasingly, have resulted in a highly mobilised population dependant on their personal vehicles. Such policies include:

1. Low fuel prices – either because of lower taxes or retail prices;
2. Dedicated funding – whether through fuel taxes being dedicated to highway investment, or specific road building grants;
3. Generous parking provisions and road capacity – through dedicated zoning codes that specify minimum parking requirements, usually provided to the consumer free or at least at a minimum cost; and the provision of unlimited and for the most unrestricted access to abundant roadways;
4. Limited travel choices – in most cities and communities there is little effort paid to providing a choice of modes of transport, such as walking, public transport and cycling, as a result public transport service quality is inferior, and the infrastructure necessary for walking and cycling is either in such poor quality or non-existent thereby making those activities inconvenient and dangerous;
5. Automobile oriented land use patterns – either through zoning codes or development practices that are biased towards low-density, segregated land use patterns, and commercial activities situated along major highways and freeways and away from public transport corridors (if they even exist), and new residential developments increasingly being introduced at the urban fringe (Whitelegg and Haq eds. 2003 and Bernick and Cervero 1997).

³ Juliet Solomon also goes into more detail regarding this issue - pg 151, in Root, A., Ed. (2003). Delivering Sustainable Transport: A Social Science Perspective. Oxford, Elsevier Science Ltd.

1.2.5 Unsupportive land-use and development policies

The decentralisation of urban land use development and transportation infrastructure has had a significant effect on the spatial structure of our cities and suburbs. In terms of economics at least, this is self evident because transport investments are inherently growth generators and more generally act as shapers of the urban environment. Yet this phenomenon isn't completely the result of either the unlimited use of the under-priced personal vehicle or misguided land use policies. Rising incomes have led to increasing demand for all consumer goods including housing, which is ultimately reflected in the change in average commuting patterns. Where traditionally the average commute was to the city centre, this has now changed to include commuting between various suburban locals. It is this changing dynamic that makes public transport's chances of success an increasing challenge (Nakamura et. al. 2004).

Parking is rarely seen as a major deterrent to public transport usage, yet research would tell us otherwise. While there are many factors that influence mode choice, free or cheap parking can be a major determinant in mode shifts away from public transport and towards the private car⁴. Dueker et al. (1998) have found that where the majority of work trips are made by single occupant vehicles (SOV) the cause is generally a combination of auto-accommodating parking policies and inadequate public transport services, conversely in cities where restrictive parking policies existed, including higher parking fees, there was a trend towards greater public transport provision. In addition changes in factors regarding parking policies tended to have a stronger outcome regarding mode choice than any other factors related to public transport service, but when both factors were combined – that is increasing the price of parking and improving public transport services it had the greatest effect on mode choice away from SOVs (Dueker et. al. 1998).

Employer provided tax-exempt parking is seen by some analysts as a market distortion that induces the excess use of the private vehicle, and is a major inhibitor to people using public transport instead for their work commute. For the most part employer provided parking is exempt under the US and Australian tax code, and the Fringe Benefit Tax on packaged cars is predominantly skewed towards overuse. In addition Dueker et al. (2001) also found that a policy of parking pricing indirectly alleviates distortions in the travel market such as congestion and negative externalities, and serves as a more obvious connection between parking costs and individual travel behaviour.

3 The desire for personal travel

In many transport economics textbooks transport is generally referred to as a derived demand, in other words, we don't desire travel in and of itself but rather because of what it enables us to achieve. However, the idea of derived demand does not appear to describe why some people travel simply for the utter enjoyment (see Mokhtarian and Salomon, 1999, pg 27 and Hamilton 2003 in Root ed. 2003). Derived demand, as an economic concept, assumes that individuals act as rational agents, intending to exploit their personal wellbeing in a utilitarian and economically constant manner (See Hargreaves Heap, 1997 in Root ed. 2003). Transport is inevitably weaved into modern society and many of the critics of transport (public or private) fail to recognise these cultural and economic contexts within which transport systems are entrenched (Root ed. 2003).

Litman (2004) expresses this incongruity about personal mobility in the US succinctly when he says that '*North American ideology celebrates individualism, freedom and consumption*'. For the majority of North Americans (and more than likely most Australians), unrestricted mobility is a vital part of their individual and collective identity, and is not merely symbolic.

⁴ Although some economists would argue that shopping parking isn't free as it is usually included in the price of the goods and services offered for sale.

Whole communities are for the most part highly automobile-dependent, and those without a personal vehicle find it increasingly difficult to participate in everyday economic and social activities. In the majority of Western cultures people are identified by their cars and non-drivers are implicitly inferior. And while the majority of middle-class residents infrequently walk, ride a bike or use public transport they increasingly see little reason to support these modes. Moreover, such ways of living have until more recently been thought to be socially and economically desirable because they allegedly represented consumer preferences and were thought to promote economic growth. Any measures to curb automobile use have been seen as detrimental to those goals. Naturally the transportation policies of governments and big business have generally reflected those apparent preferences (See Whitelegg and Haq eds. 2003).

Private vehicle ownership is now a world wide and increasing trend. The International Road Federation and the World Bank estimated that in 1998 the world motor fleet was approximately 700 million, which is 246 million more than in 1970. Between 1960 and 1998 vehicle ownership has tripled, far outpacing the population growth rate and the real rate of world economic growth during the same period. Since that time the average annual rate of increase has slowed considerably, from nearly 5% per year between 1960 and 1970 to less than 1% a year between 1990 and 1998. This slowing is largely due to an ever larger base and near saturation levels of ownership particularly in the US and many other OECD countries (As quoted in Nakamura et. al 2004).

Unfortunately, while personal travel in automobiles remains underpriced, or at the very least without any obvious market price signals about its impact on the environment and urban amenity, public transport will have a more difficult time in being a viable alternative form of travel. Bernick and Cervero (1997) cite the underpricing of the private automobile and its related infrastructure as the overriding explanation for public transport's relatively poor performance in the last decade or more (Cervero 1998; Newman and Kenworthy 1999).

1.3 What the statistics don't say

Fare revenues and the level of public funding criteria are used to evaluate the self-sufficiency and even cost efficiency of the public transport system, while the operating expenses criteria are used to examine the cost of operating the service in relation to the number of passengers it attracts and the distance it services. Average weekday ridership and annual trip numbers are a very basic way of evaluating any changes in the ridership levels, another way of assessing success. The concept of market share or mode share is also used as a performance indicator, implying that whichever mode has the market share is most dominant.

1.3.1 Commonly used performance indicators, or indicators of success and their meaning

Average weekday ridership is a way of calculating the average number of commuters each weekday, with the assumption that the greater number of riders will occur at peak period times. Total annual trips gauges the number of riders over the whole year period, which would include off-peak and non-commuter ridership, weekend and event ridership as well. Both these indicators measure the raw number of people using the service provided. And any increase in those numbers over time is generally seen as evidence of success. Naturally such a figure gives no real indication of the impact the service provides at peak period or times of high congestion on roadways. Fare revenues as an indicator is fairly obvious, but not always particularly useful if it is used to compare to other public transport systems that lack any similarities in infrastructure. It is useful only as an indicator of a service being used, and any increases in the indicator again can be seen as a sign of success. However depending on the technology that is used and the level of compliance that takes place in the system it may not always be a reliable indicator of the success of a service. In some ways

how fares are collected, and the technology that is used can determine the success of a service as well⁵.

The level of public funding as an indicator is generally used alongside fare revenues as a way of measuring cost efficiency in the system. This usually means that the percentage of cost recovery (that is, the level to which the system recovers all of its costs, generally through fare revenue) compared to the public funding it receives is used to denote that a system is cost efficient and therefore deemed successful. What this measure doesn't fully highlight is the level to which the public accepts a higher level of public funding against fare revenues because of a belief in the public transport system as a 'public good' and therefore in need of public funding. The reliance on such an indicator fails to highlight the level of public funding that is available to other forms of transport, in particular road ways. As the research highlighted earlier, it is rare for a roadway to earn its 'keep', and yet we expect our public transport system to better that, and that is in spite of the well documented biases in the transportation system towards the personal vehicle (See Whitelegg and Haq eds. 2003).

The other issue that indicators like fare revenue and ridership hide are the wider health of the economy in the area that the public transport system is servicing. More recently the U.S. economy, in particular Silicon Valley which is serviced by the San Jose/Santa Clara Valley public transport system, has been experiencing a significant downturn in employment which can only have a negative effect on the revenue and ridership levels. In 2001 in Canada, particularly the City of Vancouver, a labour dispute meant that a vital bus line had to be closed for a period of six months which considerably affected the patronage and thus revenue outcomes for that period. Such decreases aren't as a result of the public transport system being inefficient or cost ineffective (Personal communication with Santa Clara Valley Transit and the City of Vancouver Translink officers).

Indicators like mode share are measures of the impact of public transport at peak times. It is a blunt measure of the mode share usually between public transport and personal vehicles, and is used to indicate success when public transport has the majority of the mode share. Again, what this indicator hides is how many people would drive their car if the public transport system didn't exist. Nor does it give any indication of the factors that are deterring more people from using the public transport system, such as free or cheap and abundant parking, inconvenient time scheduling, overcrowding at peak times, delays, lack of information about arrivals and departures, and a lack of integration either with the surrounding urban land uses or other parts of the public transport system, not to mention the assumption that public transport needs to have the greater percentage of mode share to be deemed successful.

Operating expense indicators are another way of measuring the cost efficiency and cost effectiveness of the public transport system as a whole. These indicators are usually taken as a measure of the expense of running the system, including inputs such as salaries, maintenance and ongoing running costs. A figure that is small is generally taken to mean that the system must then also be efficient and cost effective and therefore successful. Obviously such an indicator is automatically biased towards a system that is both cheap to develop and cheap to run, and a service that is limited would score highly on such an indicator because it would also be cheaper than a service that is extensive and frequent. Cost effectiveness and cost efficiency are two commonly used indicators of success, and are usually evaluated in addition to the initial development and implementation costs, and generally take into account the cost recovery ratio that is experienced by the public transport system in question.

⁵ In Melbourne, Australia for instance the removal of on-board conductors on trams led to the prevalence of 'free-riding', and forced the government to hire inspectors instead because they were losing millions in fare revenue. In Perth because of inadequate compliance arrangements for ticketing Transit Police are obliged to act as conductors or inspectors on board for similar reasons.

What these indicators don't highlight is what may be the myriad reasons underlying each figure. If patronage is experiencing a downward trend that is directly related to exogenous factors unrelated to the public transport system, then naturally the cost of operating and maintaining the system with less fare revenue will increase. However is this because the public transport system is either cost inefficient or ineffective? Rather it would appear that the success of a public transport system, when rating it against the more commonly used performance indicators, need also take account of the underlying economic health of the surrounding area and what other factors may inhibit its success that is outside its control. Put another way, it is a questionable and simplistic assertion that a public transport system is unsuccessful because its patronage, cost effectiveness and cost efficiency levels are decreasing when it is obvious that the cause is outside the control of the public transport system, or that there exists significant impediments to its being more successful that it lacks the power to change.

The performance indicators that are missing here are those that measure the land-use integration with surrounding trip generators and urban residential areas, urban amenity, social cohesion or equity, congestion mitigation, travel behaviour change in the surrounding population, and increases in mobility and access. These indicators are often subjective and difficult to measure, but what they can describe is the extent to which the public transport system has had an impact socially and economically on the surrounding area. In addition such indicators can also more effectively highlight the extent to which there are barriers or deterrents in the wider system for enabling the public transport system to be successful (See the U.S Department of Transport, Federal Transit Administration, National Transit Database 1999, 2000, 2001, 2002, 2003; and the Translink 2004 Annual Report).

4 Concluding Comments

World wide the private vehicle has retained market share, especially for the work commute and this trend is continuing (Newman and Kenworthy 1999). Cox (2003) would have us believe that this signifies a failure on the part of the public transport system in not capturing market share and in not growing patronage further. Nevertheless, that the private vehicle, which enjoys a considerable government-led and market pricing bias, has the greatest market share is hardly an indicator of success for the automobile! If we were able to, instead, judge the two modes on an 'equal playing field' it would then be much clearer whether public transport or the private vehicle had the greatest market share and capacity to attract increasing ridership. What patronage as an indicator shows in such an environment, is that despite the inherent biases in government policy and the market generally towards the private vehicle, public transport is still managing to maintain and in some cases increase patronage in some cities⁶.

What the research here highlights is that it is insufficient to simply rate the performance of a public transport system using indicators that don't fully reflect the whole picture. Such blunt and rudimentary performance indicators like patronage, cost efficiency and cost effectiveness needs to be used with caution, and it is reasonable to expect critics to make a more thorough evaluation of each indicator result. What Cox and other critics fail to discuss is the underlying factors behind the apparent negative performance indicator. It is an exercise in confirmatory statistics to assert that a public transport system is a failure because its patronage, cost efficiency and effectiveness are all trending negatively.

The research also highlights that there is much more to achieving success than simply building and investing in a new public transport system or an extension to an existing system. It is the complimentary and supporting public and private policies that can mean success or not. Such policies include parking, urban land use, market pricing, zoning practices,

⁶ This is most apparent in the case study cities for this research, Vancouver, Portland, San Diego and San Jose.

integration of planning policies across governments and intra-governments and development incentives. The success that the North American case study cities (Vancouver, Portland, San Diego and San Jose) have achieved has occurred despite their federal governments' quite separate road program, and a general lack of integration between the different tiers of government.

The real argument here isn't about which mode is better or which mode deserves priority. A range of modes all have a vital role in our transport systems, whether they be various forms of public transport, private vehicles, bicycles or walking. If the aim is to have a transport system that is efficient and effective at moving people and the goods and services we require, then ensuring that the system as a whole is efficient and is sustainable for generations to come is essential. However for such an argument to be valid in the first place, the factors that are being argued need to be on a similar level to start with. Put another way, for there to be any valid critique about the success or otherwise of public transport, there needs to be the same discussion about the private vehicle.

Against traditional performance indicators, how would the private car rate? We know already it has enjoyed market share, particularly for the work commute, in most developed nations for many years. Therefore we can assume that its use or 'ridership' levels are high and continuing to be so. Is it cost effective and efficient and does it have a healthy recovery ratio for its funding? And there the argument becomes unstuck. In particular, in most developed nations the private car uses the road network provided for it essentially free of charge or at best considerably discounted (Cervero 1998 and Newman and Kenworthy 1999). Yet critics don't level similar requirements on the private vehicle to be cost effective and efficient. How about the less traditional indicators of success then? Does the private vehicle have the potential to rejuvenate downtown centres, enhance urban amenity, and increase social cohesion and enhance people's access to employment, recreation and social activities? The research would tell us the answer to this is often a resounding 'no! It is inadequate then, to criticise public transport for being cost ineffective and inefficient without discovering why that may be the case.

The research for this paper has highlighted that there are myriad reasons why public transport remains unsuccessful against traditional indicators of success, including inaccurate forecasting of patronage and service levels in the initial development stage, a lack of integration between transport and planning areas within all levels of governments, and local government zoning and parking restrictions that favour the automobile. Yet against more quantitative indicators of success in public transport systems, such as land use integration, encouragement of TOD, increases in social equity and urban amenity, these systems can still be rated as successful. There is certainly a need for further research that closely examines this duality, but more importantly governments need to re-examine their transport system as a whole and not in modal isolation so that a true picture can be seen of the long term sustainability and economic efficiency of the entire system and not just one aspect of it.

The salient point here is that none of these factors are related to public transport's inherent abilities to do the job required of it. Rather, what is at fault is the underlying and surrounding public and private policies that makes public transport's potential to be successful so much harder, not that public transport in and of itself is flawed. If criticism abounds, it needs to be aimed at the government planning and transportation policies that have created a situation where public transport is seen as a token social obligation rather than a vital and undeniably necessary part of any sustainable public transport system.

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