Social Sustainability of Alternate Transportation Modes at The University of British Columbia

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1.0 Introduction

1.1 The student U-Pass program at UBC

Following a successful student referendum, the University of British Columbia, in partnership with the Alma Mater Society (Student Union), and the Greater Vancouver Transportation Authority (TransLink), implemented the student U-Pass program in September 2003. Specific to UBC, the U-Pass program was developed as the cornerstone of its "made at UBC" Strategic Transportation Plan. In recognition of the many growing problems surrounding transportation at UBC, the U-Pass program was developed as a comprehensive transportation demand management (TDM) strategy. In developing the U-Pass program, several objectives were identified, including the following:

- Increase transit ridership;
- Reduce single occupant vehicle travel to, from and within campus;
- Reduce greenhouse gas emissions;
- Provide a cost savings for students who choose to use transit;
- Increase the accessibility of transit; and
- Establish and enhance partnerships between TransLink, agencies and organizations throughout the region.

Overall, the U-Pass program has been successful in achieving these stated objectives; however, there are still many opportunities to enhance the program to better meet the needs of all parties involved. According to the 18-month review of the U-Pass program conducted in May 2005, there are currently more than fourteen percent (5300) of UBC students who do not use their U-Pass, despite paying the mandatory fee for participation in the program.[1] Ten percent (3800) of those indicate they have no intention of

[1] Urban Systems U-Pass Review: Final Report (2005): 12. 27 July 2006 <http://trek.ubc.ca/research/pdf/U-Pass%20Review%20Final%20Report.pdf>

using their U-pass in the future.[2] There are a variety of barriers that can contribute to the resistance of the U-Pass program and other sustainable transportation behaviours, which will be discussed in section 3.0.

1.2 Objectives

The economic and environmental benefits of the student U-Pass program at UBC have been well established and documented. As a result of the U-pass program, students enjoy a collective transportation cost savings of more than $3 million per month; the need to build 1,500 more parking stalls over the next two years has been deferred, producing a cost-savings of $20 million; and greenhouse gas emissions have been reduced by 16,000 tonnes per year.[3]

The social implications of the program have been afforded less attention. Therefore, the primary objective of this research study is to examine the social sustainability of the U-Pass program at the University of British Columbia. A secondary objective is to examine the social sustainability of other alternate transportation modes, including cycling, pedestrians, carpooling and telecommuting. This report will serve as a preliminary qualitative investigation on social sustainability and how it relates to transportation at UBC. Furthermore, it will make recommendations for future quantitative research, and is intended as the preliminary step towards further enhancing the full potential of the U-Pass program.

The research objective of this study is to determine the social influences of transportation choice. This will include:

- Identification of the social factors that cause students at UBC to resist embracing alternate transportation modes;

[2] Ibid.: 12
[3] UBC TREK Program Centre Homepage. 31 July 2006. <http://www.trek.ubc.ca/>

- Evaluation of those factors to determine what changes may be made to encourage more sustainable transportation choices; and
- Recommendations to improve the attraction of alternate transportation modes among the UBC community, thereby reducing single occupant vehicle travel to, from and within campus.

A clear understanding of the social factors that influence transportation choice will enable the University of British Columbia to improve the existing portfolio of demand management strategies, including the student U-Pass program. It will also ensure that the faculty/staff U-Pass and Community Pass programs are implemented with the highest possible rate of participation. Furthermore, the University will be able to package the overall U-Pass system as a comprehensive program that can serve as a template from which other institutions can use to implement similar initiatives.

1.3 Social Sustainability and Public Transit

Sustainability, as broadly defined by the Brundtland Report, is the ability of a community to meet the needs of the present without compromising the ability of future generations to meet their own needs.[4] A sustainable community is one that has the ability to maintain and build on its resources, and, at the same time, has the resiliency to prevent and/or address problems in the future.[5] Within the context of public transportation, sustainability refers to a society's ability to move freely, gain access, communicate and trade without sacrificing other essential human or ecological values, today or in the future.[6]

Sustainability is typically divided into three pillars. For the purposes of this study, the three pillars of sustainability will be defined as follows:

[4] World Commission on Environment and Development "The Brundtland Report" (1987). 27 July 2006 <http://www.are.admin.ch/are/en/nachhaltig/international_uno/>
[5] City of Vancouver "Policy Report Social Development" 27 July 2006 <http://www.city.vancouver.bc.ca/ctyclerk/cclerk/20050524/documents/p1.pdf>
[6] Centre for Sustainable Transportation Homepage. 27 July 2006 <http://cst.uwinnipeg.ca/>

- **Economic and Financial Sustainability:** To be economically and financially sustainable, transport must be cost-effective and continuously responsive to changing demands.[7] In Addition, UBC has expanded this definition to include the life-cycle costs of total infrastructure as an important indicator of economic and financial sustainability.

- **Environmental Sustainability:** Transport has significant effects on the environment that should be addressed explicitly in the design of programs. Making better use of readily available and cost-effective technology is necessary, but not in itself sufficient. More strategic action is also required in the form of better-directed planning of land use and stricter management of demand, including the use of pollution and congestion charges to correct the relative prices of private and public transport.[8] At UBC, indicators such as greenhouse gas emissions and the ecological footprint, which is a measurement of the ecological impact of an organization's practices, are used to determine the extent to which UBC is environmentally sustainable.

- **Social Sustainability:** Transport that is affordable, accessible, operates efficiently, offers choice of transport mode, and supports a vibrant economy. In addition, customer satisfaction is a key ingredient in creating a socially sustainable transport system. Social sustainability is also significantly affected by psychological factors that influence transportation behavior. This includes factors such as comfort level, personal safety and security, interpretation of one's own social status and convenience.[9]

[7] World Bank. "Social and Economic Policy" 27 July 2006. <http://web.worldbank.org>
[8] Ibid.
[9] Centre for Sustainable Transportation Homepage. 27 July 2006 <http://cst.uwinnipeg.ca/>

Social sustainability is often granted much less attention than the economic and environmental elements likely because it is intangible and hard to define. Unlike the economic and environmental aspects, social sustainability cannot be easily reduced to quantitative indicators that are easy to measure; rather, social sustainability is subjective, qualitative and political.

It is nonetheless essential to consider the element of social sustainability in any evaluation of transportation modes. The social implications of transportation affect behavioral choices, which are ultimately responsible for the success or failure of any transportation strategy. Therefore, the focus of this study will be the social component of sustainable transportation.

1.4 Methodology

The relevant literature from local and international studies will first be reviewed and evaluated to determine the primary areas of the topic that require further investigation. The extent of the research conducted will be limited to qualitative observation and evaluation, with an emphasis on the analysis of the transit system for commuters to and from the UBC campus.

2.0 Transportation at UBC since U-Pass

This section discusses the current mode share of transportation at UBC since the implementation of the student U-Pass program in September 2003.

2.1 Changes in travel patterns

Since the implementation of the U-Pass program in 2003, there has been a significant shift in travel patterns from automobiles to transit at UBC. The U-Pass program has been a resounding success, the results often exceeding expectations. The following will describe some of the changes in transit ridership and travel by other alternative modes at UBC since the program was implemented.

Transit Ridership

During the first year of the U-Pass program, transit ridership to and from the UBC campus increased by 53%. During the second year of the program, transit ridership increased by a further 15% to a combined net increase of 68%. These results are summarized in Table 2.1.

Table 2.1

Weekday Transit Ridership at UBC

	Public Transit Ridership
Fall 2002	29,700
Fall 2003 *Increase from Fall 2002*	45,400 53%
Fall 2004 *Increase from Fall 2002* *Increase from Fall 2003*	49,900 68% 10%
Fall 2005 *Increase from Fall 2002* *Decrease from Fall 2004*	45,600 53% -9%

Source: TransLink, CMBC and UBC

Transit service improvements during the first year of the program were planned for a 30% ridership increase. The actual ridership increase was 53%

- considerably higher than expected. Not surprisingly, this caused a significant supply deficit on most bus routes bound for UBC. Today, demand is continuing to increase faster than service improvements can accommodate, which is leading to overcrowding on most UBC bus routes during peak travel periods. However, TransLink and UBC continue to work together to address these issues through regular service improvements as resources allow, and other creative methods such as shifting class start times to broaden the morning arrival peak.

Other Alternative Travel Modes

Table 2.2 and Figure 2.1 provide a comparison of travel modes for trips to and from UBC, before and after implementation of the U-Pass program.

Table 2.2

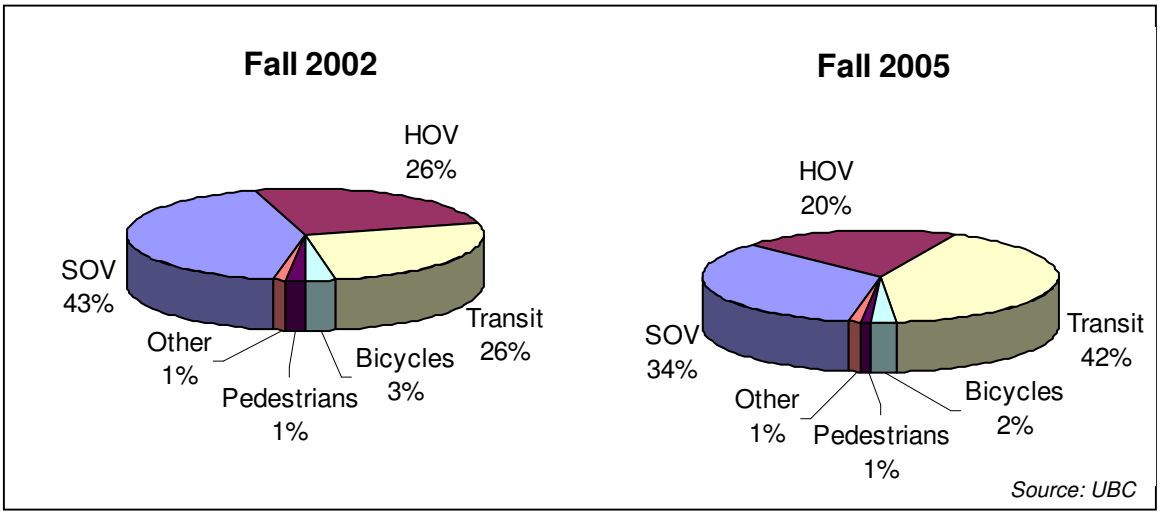
Travel mode trips at UBC (weekday person trips across UBC/UEL)

	Before U-Pass	After U-Pass		
Mode	**Fall 2002**	**Fall 2004**	**Fall 2005**	**% Change (02-05)**
Single-occupant vehicles	48,400	43,800	37,700	-11%
Carpools & Vanpools	29,100	22,400	21,600	-26%
Transit	29,700	49,900	45,600	+54%
Bicycles	3,300	1,600	2,400	-27%
Pedestrians	1,600	600	900	-44%
Motorcycles, trucks	1,400	1,400	1,200	-14%
Total	**113,500**	**119,700**	**109,400**	**-4%**

Source: UBC

Figure 2.1

Travel mode trips at UBC (weekday person trips across UBC/UEL)



Key observations regarding the changes in travel patterns at UBC include:

- **Transit:** The transit mode share at UBC in fall 2005 accounted for 42%, more than any other mode, including single occupant vehicles. Transit is now the most commonly used mode of travel to and from UBC.

- **Carpools:** The number of carpool trips at UBC has been steadily declining since 1997, as transit service levels have increased. In fall 2005, carpools had decreased 26% compared with fall 2002, the year before the implementation of the U-Pass. This indicates that carpoolers are the most likely group to shift to transit if transit service levels provide a similar level of convenience when compared to carpooling.

- **Automobile traffic:** Following the implementation of the U-pass program, overall automobile traffic (single occupant vehicles, carpools) to and from UBC decreased 23%.

- **Bicycles:** The total number of bicycle trips to and from UBC decreased 15% in the first year following the implementation of the U-Pass program. In fall 2005, bicycle trips increased by 50% when compared to the previous year. Bicycle infrastructure, such as bicycle lanes on roadways and bicycle racks on buses, has also increased.

- **Parking:** The overall demand for parking at UBC decreased 10% in fall 2003, as compared with fall 2002. It is also noteworthy that the supply of parking on campus decreased by several hundred parking stalls during the same time period.

- **Total trips** to UBC decreased by 4% in fall 2005 when compared to the previous year. This is likely a result of more students and faculty living on campus, thereby eliminating the need to commute.

- **Transit corridors:** As a result of the increased volume on UBC bound routes, there has been a dramatic increase in the usability of transit corridors for other commuters who are not UBC students. For example, residents living within close proximity to the 99 B-Line Broadway corridor benefit from the increased frequency of buses caused by the service improvements implemented to accommodate the U-Pass program.

3.0 Barriers to Alternate Transportation Modes

There is widespread acknowledgement that air quality is getting worse, traffic congestion is increasing, and there are many limitations to increasing road capacity (fiscal, environmental, land use). These conditions mean that it is costing much more – both economically and environmentally – to commute in single occupant vehicles. Travel times for commuters have also increased in all major Canadian cities except Vancouver, when compared to ten years ago.[10] The reality is that single occupant vehicle travel is not sustainable and therefore the dependency on them must decrease. This implies a meaningful shift in transportation behavior.

Transportation behavior is often assumed to be dependent on the objective service levels of the public transportation system. This is a misconception. Conversely, travel mode choice is dependent on the psychological factors such as beliefs, attitudes and habits that are influenced by the service levels of public transportation.[11] This is an important distinction because it indicates that a change in service level will only influence travel choice if and only if it influences the psychological factors that the behaviour depends on.

[10] Statistics Canada. "General Social Survey" 12 July 2006. <http://www.statcan.ca/Daily/English/060712/d060712b.htm>

[11] Satoshi Fujii & Ryuichi Kitamura. "An experimental analysis of habit and attitude change." 31 July 2006. <http://www.springerlink.com/media/bn4gvmxvur3ha4k2ux4g/contributions/p/7/3/6/p736732033370222.pdf>

Most drivers living in urban areas would prefer to dive their vehicles less and use alternatives (such as public transportation, carpools/vanpools, bicycling, etc.) more, provided they are **convenient**, **comfortable** and **affordable** (Litman 2006). The automobile has been the preferred transportation mode in North America over the last century largely because it has had the ability to meet these criteria. Therefore, if any alternative mode of transportation is going to be viable to commuters, it is essential that it meet these three fundamental criteria.

3.1 'Unfreezing the habit'

Habits are formed after the repeated engagement of a given behaviour. Therefore, any discussion about inducing automobile drivers' behavioural changes to public transportation must focus on habits because they inherently impede behaviour change. Habits are perhaps the greatest barrier to alternative transportation modes.

In their 2001 study at Kyoto University in Japan, researchers Satoshi Fujii and Ryuichi Kitamura determined that habitual drivers often had negative beliefs about the travel times offered by public transport. They proposed that a temporary structural change would correct this negative belief about the transit system, and thereby induce a lasting behavioural change.

A temporary structural change means any change that forces drivers to temporarily use public transportation. This could include highway closures or offering free public transit on select days. The idea is to 'unfreeze' the habit of commuting in an automobile by forcing a change in habit. Temporary structural changes are often more feasible than permanent structural changes because they do not require a large monetary budget for implementation.

For this study, the researchers chose a one-month free bus pass as the method of intervention. An experiment consisting of 43 drivers was carried out, in which a one-month free bus pass was given to 23 drivers in an experimental group but not to 20 drivers in a control group. Attitudes towards, habits of, and frequency of using automobile and bus were measured immediately before, immediately after, and one month after the one-month long intervention. The results of this study confirmed that a one-month free bus pass weakens the habit of using an automobile rather than public transportation and that the effect was sustained one month after the intervention. [12]

The temporary structural change of offering automobile drivers a one-month free bus pass seems to have the potential to change habit, attitude, and travel mode choice. Therefore, it would be wise to consider temporary structural change as a possible TDM strategy aimed at increasing the demand for alternate transportation modes, such as public transportation, carpools and vanpools, cycling and telecommuting.

3.2 Convenience

The private automobile is the most popular mode of transportation for Canadians and people around the world. In 2004 more than 17.7 million light vehicles traveled a total of 283.4 billion kilometers on Canadian roads.[13] The automobile has proven to be so popular largely because it is convenient. Contemporary society often places such an overwhelming demand on people's time that most discretionary users will not choose public transit over the automobile under any circumstances if the travel time is significantly greater. This is evidenced by a relatively insignificant shift in demand for automobile travel in recent months despite rising fuel costs. The opportunity cost of time is simply too great for many people to spent a significantly longer period of time commuting by public transportation.

[12] Ibid.
[13] Centre for Sustainable Transportation Homepage. 27 July 2006 <http://cst.uwinnipeg.ca/>

Therefore, the convenience feature is critical to the social sustainability of any public transit system.

The following factors are important for the evaluation of a transit system's level of convenience:

- **Availability** – when and where public transit is available. Transit service must be offered when the commuter needs to travel in a location close in proximity to their point of departure and their destination.

- **Frequency** – the amount of trips made each hour or each day.

- **Travel Speed** – The total amount of time required to commute by automobile compared to transit. Several cities in North America have employed transit priority measures (such as HOV lanes), which give buses preferential treatment over other vehicles, minimizing the delay impacts of congestion and traffic signals, thereby increasing the travel speed of transit. A 2000 study in Shoreline, Washington revealed that transit travel speeds could be nearly doubled by implementing effective transit priority measures.[14]

- **Reliability** – the extent to which actual transit service follows published schedules.

- **Integration** – ease of transferring between transit and other transportation modes. This includes transferring between buses or rapid transit lines as well as park and ride options.

[14] Evaluating Arterial Street Transit Preferential Treatment. 31 July 2006. <http://www.ptv-ag.com/download/traffic/library.pdf>

- **Accessibility** – ease of reaching transit stations and stops. How far does a commuter have to walk to the transit stop or station? How difficult is it to reach the stop or station? What is the quality of the local street design?

- **Information** – the extent to which transit information is easy to obtain and understand.

- **Customer service** – how helpful and friendly are the transit employees? Not only can the level of customer service affect the convenience for commuters, but it also can contribute to the formation of positive or negative feelings and beliefs towards public transit. If a discretionary transit user has a bad experience using the transit system, they may be deterred permanently; conversely, a positive experience could lead to a habitual user.

- **Payment options** – A variety of payment options for all types of fares is necessary to ensure convenience for transit users.

3.3 Comfort

The automobile has also been a popular mode of transportation because of its relative level of comfort compared to other modes. A sustainable transportation system that is a viable alternative to the automobile must be comfortable for commuters. Factors to consider when evaluating the comfort level of a transit system include:

- **Seating capacity**: the most obvious comfort factor is the amount of available seating on routes. Overcrowding necessitates standing for many passengers. It can be very uncomfortable for commuters to stand for long periods of time in a crowded area. Additionally, the material and padding on the seats as well as legroom contribute to the comfort of a commuter.

- **Aesthetics** – the appearance of transit vehicles, stations, waiting areas and signs must look clean and well maintained. The aesthetic factors of a transit system can have a significant psychological affect on people, as they contribute to the formation of impressions and attitudes towards the general concept of public transit.

3.4 Affordability

The affordability of a transit system is an important social sustainability factor. It is also a critical equity objective, since it affects the cost burdens and opportunities available to disadvantaged users.

Transit Fare Pricing

There has been considerable research conducted on the behavioral affects of transit pricing over the last several decades. To the extent that transit operations result in less congestion and cleaner air, a compelling argument can be made to keep fares low by subsidizing services as a way of rewarding socially sustainable behavior. However, the results of extensive research conducted on the behavioral affects of transit pricing over the last several decades indicates that this is not the most effective pricing strategy to increase ridership. [15]

Most research on transit fares has focused on the measurable effects of price increases or decreases on ridership, using price elasticity of demand for transit as the chief indicator.[16] The one limitation to these studies is the need for analysts to invoke the *ceteris paribus* (other things being equal) assumption when measuring price elasticity from two points in time, as price changes are often implemented in tandem with other service revisions.

[15] Robert Cervero. "Transit pricing research" 31 July 2006. <http://www.springerlink.com/media/bec6unwuuhcvh16pxgfy/contributions.pdf>
[16] Ibid.

According to 77 research studies over a 20-year period, the demand for transit service declines by one-third of a percent for every one percent increase in fare.[17] Therefore, this rate of decline corresponds with a -0.33 fare elasticity. This is now considered the industry standard and referred to as the Simpson-Curtin rule. These studies also indicate that riders are typically more sensitive to fare increases than decreases.[18] Additionally, there is often an immediate drop-off in ridership following a fare increase; within a year or so, ridership typically readjusts, returning close to its prior levels, all other things being equal.

Empirical research reveals that the elasticity of service quality is roughly twice as high as fares. Mode choice studies in Chicago, San Francisco and Boston found that travel-time elasticities are in the range of -0.59 to -1.16, with the high end of the range representing peak travel times. Commuters are especially sensitive to out-of-vehicle travel time; waiting time, in particular, is perceived as the most onerous by most transit users. This suggests that riders are more sensitive to reliability, availability and frequency compared to any other service feature.

The fact that transit users have consistently reacted more strongly to service than fare changes leads the inescapable conclusion that transit will be able to best compete with the automobile through introducing significant service improvements rather than subsidizing fares. Emphasis should be placed on providing speedy, on-time connections rather than maintaining low fares.

Fare price Structure

There are a number of fare structure options, each with different advantages and disadvantages relating to social sustainability. The most common fare structure in North America is a flat fare, which charges a

[17] Ibid.
[18] Ibid.

constant price regardless of the length of trip or time period.[19] Flat fare structures are easiest for users to understand. Zonal fares are the second most popular fare structure in North America.[20] Under this system, exact surcharges are collected from long distance travelers. This structure is complicated to collect and enforce, and it also gives rise to inequities (i.e. short distance users paying a surcharge for crossing a zone boundary). The third option is graduated pricing, whereby users pay a fare on a per-kilometer basis.[21] This structure requires on board fare readers and distance monitors, which are often seen as too expensive and cumbersome for conventional transit systems. [22]

[19] Ibid.
[20] Ibid.
[21] Ibid.
[22] Ibid.

4.0 Current Transportation at UBC

4.1 U-Pass Usage

According to the 18-Month U-Pass review, there were 38,000 students at UBC eligible to receive a U-Pass in fall 2004, as reflected by the number of eligible students during the September-to-April academic year when enrollment is the highest.

Most students indicate they use their U-Pass. Between September and November 2004 86% of students at UBC reported they used their U-Pass. Furthermore, nearly half of those students who use their U-Pass make 10 or more trips per week, which indicates that transit is their primary mode of travel to and from UBC every day of the week. Table 2.3 provides a summary of U-Pass usage.

Table 2.3

U-Pass Usage

	UBC students
Students included in U-Pass program	38,000
U-Pass Usage (Sept-Nov 2004):	
▪ *Have used:*	86%
▪ *Intend to use:*	4%
U-Pass trips per week:	
▪ *To/from university*	6.0
▪ *To/from other destinations*	1.2
U-Pass trips per week:	
▪ *10 or more trips*	45%
▪ *4-9 trips*	26%
▪ *1-3 trips*	10%
▪ *0 trips*	19%

Source: TransLink

Most students support the U-Pass program. In a referendum in February 2005, UBC students voted overwhelmingly in favor (93%) of continuing the U-Pass program with a $2 per month price increase. Students who use their U-Pass strongly support the program.

4.2 U-Pass Non-Users

Despite the overall success of the U-Pass program, there are still a significant number of students who are eligible to receive a U-Pass and do not use transit. At UBC, approximately 6,000 students of the 38,000 students eligible in fall 2004 did not pick up their U-Passes.

To evaluate the student U-Pass program for the 18-Month Review in May 2005, Qualitative Research Associates Inc. was commissioned to explore, in greater depth, non-user attitudes towards the U-Pass program, as well as their opinions of transit service. A total of five focus groups were assembled. The following summarizes their findings.

In general, there are two categories of non-users – those who choose not to use transit, and those for whom transit is not a practical travel option (generally, these students live in outlying areas with low levels of transit service).

Students indicate the following key reasons why they do not use transit:

- **Travel times** by transit are longer than by automobile, particularly for those students traveling long distances. For example, the trip from Richmond to UBC is a 20-minute automobile drive, compared to a 60-minute commute by transit, including a transfer at Richmond Centre. The travel times by transit for many areas of the lower-mainland are significantly higher than travel times by automobile.

- **Service Frequencies,** particularly in evenings and weekends. Many students note that the bus they would often take during these time periods only runs every 30 minutes or less, and they did not see this as an attractive frequency of service.

- **Service hours:** Students living in outlying areas indicated that limited hours of service on the routes they would use are a barrier to using transit.

- **Pass-bys:** Some students who drive to campus reported that they have seen buses pass by waiting passengers because the bus is already beyond capacity. If the student is traveling at night or on the weekend on a route with a service frequency of 30 minutes, it is especially frustrating to see a bus pass by waiting passengers. This re-affirmed their choice to drive.

- **Service reliability:** Some students indicated that they perceived transit services as unreliable, and could not depend on transit to arrive to campus on time.

Table 2.4 summarizes the reasons why students at UBC do not use their U-Pass. The two principal reasons are: existing access to an automobile; and poor transit service from where the student lives.

Table 2.4

Most Common Reasons for not using the U-Pass

Have access to automobile	51%
Transit is slower than automobile	30%
Poor transit service where students lives	6%
Student does not travel to campus frequently	4%
Waiting times for buses are too long	9%

Source: TransLink

A large majority of non-users support the U-Pass program even though they do not use transit. Reasons for supporting the program include benefits to their fellow students, benefits to the environment, and benefits to themselves, such as reduced competition for parking spaces and less traffic

congestion on routes to and from UBC. This suggests a positive shift in support for the program from non-users since the initial student referendum.

4.3 Transit system qualitative evaluation

Using the indicators described in section 3.0, this section will evaluate the social sustainability factors of the current transit service to and from UBC. The evidence provided herein is primarily qualitative and anecdotal in nature.

Convenience

- **Availability and Accessibility:** Although TransLink has been fairly successful in expanding transit service availability to most areas in Vancouver, students point out that availability in the outlining areas is poor. Furthermore, long walking distances are often required to reach transit stops. Students (especially those living in residence) indicate that the bus loop on campus is not centrally located; the walk from the bus loop to many of the residences can take up to 15 minutes.

  Students living in the Marine Drive residence, for example, find it especially difficult to carry groceries from the bus loop, especially if the weather is poor. The existing campus shuttle service is often not considered as an option, as its frequency is only every 30 minutes. If a student gets off the bus at the bus loop and just misses the campus shuttle, they would have to wait an additional 30 minutes; walking would almost certainly require less time. Moreover, the campus shuttle service is not well advertised; many students are not aware that such a service even exists. This perception may change with the implementation of the TransLink Community Shuttle program (September 2006), as it will provide a higher profile service that is compatible with TransLink's regional network of

buses. Although the service will operate on 30 minute frequencies, students may become more inclined to time their trips in order to ensure minimal wait times between transfer points from conventional buses to the Community Shuttles.

- **Frequency:** On many routes to UBC the frequency level is inadequate. Many students relate having to wait two or three busses before getting picked up during peak periods. Some students have experienced being late for class or even missing exams because of bus delays. At best, there is standing room only for commuters on UBC routes during peak periods.

- **Travel speed:** For those students living in outlying, poorly serviced or unserviced areas of Greater Vancouver, the time it takes to commute is a significant barrier to transit. The commute by transit is simply far too long compared to the automobile.

- **Reliability:** For the most part, transit service in the Greater Vancouver area is exceptionally reliable. Actual service is generally consistent with published schedules.

- **Interlining:** Much of the travel speed issues are caused by poor interlining of transit services. Often, there are difficulties when transferring from one bus to another. This is caused by stops that are separated by very busy roads or other impediments (such as Granville & W70th Avenue). Commuters often have to practically run from one bay to the next to make the transfer in time. Additionally, transfer times are sometimes excessively long, caused by one bus arriving minutes after the connecting bus has left the transfer point. Better interlining of bus stops and transfer points could dramatically decrease travel times.

- **Information:** Information about routes and schedule times is judged to be adequate. TransLink's website, which has trip planning capabilities as well as route schedule information, is effective and user-friendly. The automated phone service, the phone number for which is advertised on every transit stop sign, is also very easy to use and effective.

- **Customer Service:** Many students report poor customer service from TransLink employees. Some bus drivers are occasionally unfriendly, unwilling to help and even rude to students. Another problem is the excessive time required for bus drivers to switch once their shift has been completed. Sometimes a full bus will wait at a stop for 7-10 minutes to accommodate the shift change; this seems unreasonable. Also, complaints to TransLink often receive no response.

- **Payment options:** For students who have U-Passes, there is no need to consider payment options. However, for other commuters, it is sometimes very frustrating and difficult to pay as the only accepted payment option for commuters without a monthly or employer pass is cash. Therefore, a commuter must ensure that they have the exact change every day.

Comfort

- **Seating Capacity:** Most routes destined for UBC during peak hours (and often during non-peak hours) are full to capacity. Standing room only is routine, which can be very uncomfortable and restricts the ability of commuters to make use of the travel time by reading or studying, which for some might be seen as an advantage over driving.

- **Seats:** The seats that are available on the standard buses provide adequate comfort. However, the seats on the old trolley buses are uncomfortable as they are hard surfaces. All buses have very little legroom. It is noteworthy, however, that the new buses in service on the 480 route have individual coach bucket seating with excellent padding and material, which are considerably more comfortable.

- **Aesthetics:** Many of the busses in the current trolley fleet are old and are considered eye-sores. The standard buses in use on most UBC routes appear acceptable. However, the seats in the rear of buses are often vandalized and garbage can be found on the floor.

- **Other considerations:** The newer coach buses in use on the 480 route are considerably more comfortable for a number of reasons. First, as previously mentioned, the seats are far more comfortable than other buses. Second, they are air-conditioned, which provides an extremely refreshing climate. Not only does the air conditioning help when the weather is warm, but it also helps to redress the odor problems that arise in overcrowded areas. Third, these buses have overhead luggage compartments and overhead directional lighting, both of which make significant contributions to better comfort.

Affordability

Students generally feel that the U-Pass is affordable and provides exceptional value for money. For the average student, the pass generally pays for itself very quickly, usually within weeks.

5.0 Recommendations for more socially sustainable transportation

RECOMMENDATION #1: More buses, more often.

The most obvious – and perhaps most significant – barriers to public transit for UBC students are availability and frequency. More buses and more frequent services, especially on routes from the outlying areas of Greater Vancouver, will have the greatest impact on increasing transit ridership. Poor availability and frequency are almost certainly barriers to transit ridership for a portion of the fourteen percent of eligible students who do not use their U-Pass. Furthermore, these improvements will decrease problems relating to overcrowding and pass-ups, which has the potential to increase the comfort, convenience and reliability of the transit system.

Additionally, frequency on UBC routes must also be improved on evenings and weekends. During these time periods, transit service on many routes is either not available or infrequent. For many students, frequencies of 30 minutes are not considered desirable. More frequent service in the evenings and on weekends would be valuable, especially for those students living on campus.

RECOMMENDATION #2: Introduce new fare medium.

Prior to the implementation of the U-Pass program, most students who traveled by transit used monthly passes. When boarding the bus, passengers with monthly passes simply show their pass to the driver. In contrast, students must now insert their U-Pass into the farebox, which requires considerably more time than showing the pass to the bus driver. As a result, dwell times (the time a bus is stopped at a bus stop) have

increased substantially on routes serving UBC.[23] Not only does this cause an increase in round-trip travel time, which then creates a need for more buses, but it also adversely affects schedule reliability. TransLink and UBC should study the feasibility of introducing a new fare medium that does not need to be inserted into the farebox to be verified for authenticity. Possible examples include the smartcard or a proximity card.

RECOMMENDATION #3: Expand all-door Boarding.
Currently, all-door boarding is permitted at the UBC bus loop and the Commercial Drive/Broadway Skytrain station. The expansion of all-door boarding to all stops on high volume routes, such as the 99 B-Line, would help to reduce travel times.

Another possibility would be to render all buses on high-volume UBC routes 'fair paid' zones, which would eliminate the need for the driver to verify the authenticity of transit passes, thereby increasing travel speed. This would function the same way as the Skytrain and Seabus proof-of-payment systems currently operate. Commuters would have to produce a valid pass for inspection upon request from a transit authority employee and violators would be subject to fines. Given the majority of commuters on the high-volume UBC routes are students that automatically have a U-Pass, fare evasion would likely not be a major problem.

RECOMMENDATION #4: Study the feasibility of additional transit priority measures. Transit priority measures, such as dedicated bus lanes, have the potential to dramatically decrease travel times. To that end, further transit priority measures should be investigated for high volume routes to UBC, such as the 99 B-Line route along Broadway.

[23] Urban Systems U-Pass Review: Final Report (2005): 12. 27 July 2006 <http://trek.ubc.ca/research/pdf/U-Pass%20Review%20Final%20Report.pdf>

RECOMMENDATION #5: Improve the comfort and aesthetic conditions of all buses. More comfortable seats, air conditioning, overhead baggage compartments and reading lights, as observed on many of the buses currently in use on the 480 route between UBC and Richmond Centre, should be introduced on all bus routes. These factors noticeably improve the comfort experienced by commuters.

RECOMMENDATION #6: Improve integration of transit routes. As one of the greatest impediments to travel speed, the integration of bus routes must be improved. For many students commuting from the outlying areas of Greater Vancouver, the lack of integration of bus routes is the primary cause of drastically increased travel times when compared to the automobile.

RECOMMENDATION #7: Introduce more effective ways of communicating schedule and route information. Some bus stops have route schedules posted on plastic devices located on the polls of transit signs. Presumably, this would be relatively inexpensive and simple to expand to all routes and stops within the system, which would make schedule time inquiries much easier than having to call the automated TransLink information line.

Some transit systems in North America, such the San Francisco Bay Area Rapid Transit Authority, have developed software for pocket PCs, iPods and blackberries that allows the user to plan trips, look up departure times, view route maps and station information. The application can be easily downloaded for free from the transit authority's website. Additionally, users can request automatic text message and email notifications that are sent to a mobile device directly from the website. These measures would likely be very popular and effective with students. TransLink and UBC should investigate how similar information services can be implemented.

RECOMMENDATION #8: Study the feasibility of expanding the U-Pass program to students who are not registered for courses during the summer months. Many students who work during the summer months depend on the transit system for transportation and are required to purchase regular monthly passes at $69/month for one zone. Even at an increased cost over the Winter Term fee, a U-Pass for the summer months would be desirable for non-registered students.

RECOMMENDATION #9: Improve customer service and relations. TransLink employees should be helpful and be well-informed about the U-Pass program, which would enable them to provide consistent answers to inquiries. Furthermore, TransLink employees should always be respectful, genuinely interested in making the transit experience enjoyable for commuters, and generally willing to provide quality service.

RECOMMENDATION #10: In the long-term, TransLink and UBC should study the feasibility of extending Skytrain to the UBC Point Grey campus. Research indicates that rapid rail transit is considerably more desirable when compared with the bus.[24] Cities in North America with large rail transit services have significantly higher per capita transit ridership.[25] This is largely because rapid rail transit is more convenient. Rapid transit tends to provide better service quality that attracts more riders, particularly discretionary users. It can carry more passengers per vehicle and causes less noise and air pollution compared with diesel buses.

Essentially, rapid rail transit can be compared to a luxury vehicle: it costs more initially but provides higher quality service and greater long-run value. Rapid rail transit offers more legroom, comfortable seats, a smoother and quieter ride, which therefore increases the comfort level and

[24] Centre for Sustainable Transportation Homepage. 27 July 2006 <http://cst.uwinnipeg.ca/>
[25] Ibid.

provides a greater ability to read, converse, etc. Rail transit also has greater travel speed and schedule reliability, which is associated with grade-separated transit.

UBC is the second largest commuter destination in the Greater Vancouver area next to the Downtown core; therefore, the demand for transit would almost certainly sustain the expansion of Skytrain to campus.

RECOMMENDATION #11: Aggressively explore other sectors of the market where the U-Pass philosophy can be expanded. The success of the student U-Pass program proves that a targeted demographic will use transit when the infrastructure and service is implemented; other sectors of the market would likely react similarly. As the transit system is continuously improved to render it more socially attractive, more commuters will begin to engage in sustainable transportation behaviour. The first areas to explore the feasibility of this concept should be UBC's University Town, Point Grey and Kitsilano, because of their relatively close proximity to UBC. TransLink would benefit from the increased revenue stability generated from these programs.

RECOMMENDATION 12: ***Adopt Effective Advertising Campaigns to promote socially sustainable service improvements.*** Once service improvements have been implemented, effective advertising campaigns must be employed to highlight how the transit system is more socially attractive.

6.0 Recommendations for future research

Future research on the social sustainability of public transportation should focus on the psychological and sociological factors that affect the decision-making process. There is a distinct possibility that issues such as social class and self image have profound effects on transportation behaviour; however, relatively little research in this area is available. Both quantitative (surveys) and qualitative (focus groups) research should be conducted on these topics.

7.0 Conclusions

There is no doubt that the student U-Pass program at the University of British Columbia has had a significant impact on students' transportation choice. While the U-Pass program has been extremely successful, there will always be room for more improvements.

Since its inception in September 2003, the U-Pass program has led to increased transit ridership and decreased single-occupant vehicle travel on campus, thereby facilitating more sustainable transportation behaviour. Perhaps the most significant achievement of the U-Pass program is that it has created a 'transit culture' among UBC students. UBC students are now conscious of their transportation behaviour and are actively thinking about alternatives to the single occupant vehicle. This effect has the potential to last a lifetime.

Given these incredible benefits, the U-Pass program can be used as a framework for other institutions and communities in the Greater Vancouver region and around the world who are looking to develop more sustainable transportation choices for commuters.

The possibility of attracting additional ridership – from students currently not using the U-Pass and faculty/staff and community members – is achievable, providing that the suggestions stated herein are employed. If transit is going to be a real alternative to the automobile, then it is absolutely essential that it be convenient, comfortable and affordable.

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