# FROM 'LOSER-CRUISER' TO 'WINNER-BAGO': INCREASING TRANSIT RIDERSHIP IN KELOWNA, BC

by

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Bachelor of Arts (Hons), Simon Fraser University, 2007

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF PUBLIC POLICY

In the
Faculty
of
Arts and Social Sciences

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SIMON FRASER UNIVERSITY

Spring 2009

# APPROVAL

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**Degree:**                                 **M.P.P.**

**Title of Capstone:**                      **From 'Loser-Cruiser' to 'Winner-Bago':**
                                            **Increasing Transit Ridership in Kelowna, BC**

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# Abstract

This study examines why some people in Kelowna, British Columbia choose not to travel on public transit buses and employs research findings to recommend policy options to Kelowna Regional Transit for increasing ridership. An original survey of 334 Kelowna residents testing 37 possible factors influencing ridership reveals people are less likely to use transit if they are retired, feel the system has poor connections, report buses are too slow and would not want to be seen at a bus stop. The study forwards four options to overcome these barriers: express buses, increased service, service information dissemination and increased advertising to attract retirees and combat negative stigma toward transit. After using four criteria to evaluate options relative to the status quo, the study recommends Kelowna Regional Transit better distribute information about existing bus services then increase anti-stigma advertising.

**Keywords:**

Bus, Transit, Public Transportation, Ridership, Perceptions, Attitudes, Stigma, Shame, Kelowna.

# Executive Summary

This study develops and evaluates options to increase bus ridership in Kelowna, BC. The primary source of information is a survey of 334 Kelowna residents designed to understand why some and not other Kelowna residents do not utilise public transit. After examining 37 variables regarding bus rider characteristics, attitudes and perceptions of public transit services, descriptive statistics and logistic regression findings suggest:

- Poor connections result in lower ridership. Those who feel that the bus system in Kelowna has poor connections with unreasonable wait times at transfer points are 3 times less likely than those who feel connections and wait times are reasonable to ride the bus.

- Slow buses result in lower ridership. Those who feel that taking the bus in Kelowna takes up too much time compared to car driving are 4 times less likely than those who disagree with this statement to ride the bus.

- Negative stigma results in lower ridership. Those who agree with the statement "I wouldn't want to be seen waiting at a bus stop in Kelowna" are 5 times less likely than those who disagree with this statement to ride the bus.

- Unfamiliarity with the bus system results in lower ridership. Those who answered the question "How well do you know the bus system in Kelowna?" with "Not very familiar" or "Not at all familiar" are 15 times less likely than those who answered "Somewhat familiar" or "Very familiar" to ride the bus.

- Retired people are not riding the bus. Those who are retired are 5 times less likely than those who are not retired to ride the bus.

Following a review of survey results and consideration of action taken in other jurisdictions the following options for improving transit ridership are considered:

- *Status Quo:* No change, current policies and practises remain in place.
- *Express Buses:* Implement Rapid Bus service along principal Kelowna travel corridor (Harvey Avenue/Highway 97) *as per existing plans* under RapidBus BC.

- *Increased Service:* Rapidly acquire new transit vehicles to improve connection times, frequency of service and route offerings.

- *Service Information Dissemination:* Install an array of new low and high tech notification tools including: schedule-tubes at all major bus stops, trip-planning software on the transit authority website, text-message based 'next-bus' service, smartphone/iPhone App or mobile internet site and Facebook application.

- *Increased Advertising:* Develop an advertising campaign (print, radio, or television) to combat negative stigma attached to bus riding. Also create and distribute informational pamphlet directed at Kelowna retirees, espousing particular features and benefits of transit attractive to retired people.

Following a multi-criteria policy analysis comparing these options to the status quo in terms of cost, effectiveness, administrative ease and public acceptability, this study recommends the Kelowna Regional Transit Authority make Service Information Dissemination its top priority. This recommendation is supported by surveys findings indicating Kelowna residents familiar with the city's transit system are far more likely to use it than those who are not familiar. Furthermore, key informants note providing new avenues for accessing transit information has a favourable effectiveness to cost ratio in terms of increasing ridership and that these tools are among the most-requested improvements from transit users. This study also recommends Kelowna Regional Transit employ Increased Advertising in future to combat negative stigma about bus riding and attract retirees to transit. By spreading positive information about the bus system in Kelowna, ridership should be increased relative to the status quo. The study recommends against maintaining the status quo following poor evaluation results, but does not recommend against implementing Bus Rapid Transit given significant resources are already committed.

*In memory of Doctor Ian Dyck, Associate Professor of History, Simon Fraser University.*

# Acknowledgements

First and foremost, sincere thanks go to Doctor Kennedy Stewart for providing sound advice and for spending much time providing comments and guiding me through this project. Also, thank-you to Doctor Nancy Olewiler for your constructive observations on this project.

Appreciative thanks go to Ron Westlake, Jerry Dombowsky and Mike Kittmer of the City of Kelowna, Tania Wegwitz and Anita Wasiuta of BC Transit and Mike Docherty of Farwest Transit Services Inc for kindly providing assistance and information to me along the way.

I am also grateful to Scott Byers for his counsel (and for helping to come up with a great title). Thanks to those who helped with survey work: in particular, Jeannette Mergens, Mom and Jeremy Finkleman. You helped keep me motivated during the bitter cold days in December at the Queensway bus loop. Also, heartfelt appreciation to Meghan for your unwavering support this year. And thank-you to my parents, for everything.

Finally, I would like to acknowledge Doctor Ian Dyck and the Simon Fraser University History Department. My time spent under your instruction inspired me to engage with the Arts and has been integral to my success.

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# 1: Policy Problem and Background

This chapter introduces the transportation challenges faced by the City of Kelowna and explores Kelowna's unusually low level of transit ridership as compared to Canadian, British Columbian and other major British Columbia metropolitan area averages. The chapter offers hypotheses as to why transit ridership in Kelowna is low, including the idea it is caused by negative stigma toward bus riding.

## 1.1    Policy Problem: Transit Use in Kelowna

Located in the Central Okanagan, the Kelowna Census Metropolitan Area (CMA) is one of the fastest growing regions in British Columbia, expanding at a rate of approximately three per cent per year (IBI Group, 2005, 1). At this rate, the CMA's 2006 population of 162,000 will grow to 225,000 persons by 2021 (Statistics Canada, 2007). The Kelowna CMA is the third largest metropolitan area in British Columbia, after Vancouver and Victoria.

*Table 1.1: Mode of transportation to work across various jurisdictions (000s)*

| Mode of transportation[1] | Canada | British Columbia | Vancouver (CMA) | Victoria (CMA) | Kamloops (CA[2]) | Kelowna (CMA) |
|---|---|---|---|---|---|---|
| All modes | 14,714 | 1,890 | 1,003 | 159 | 45 | 73 |
| Car, truck, van, as driver | 10,644 (72%) | 1,354 (72%) | 675 (67%) | 103 (65%) | 36 (80%) | 59 (81%) |
| Public transit | 1,623 (11%) | 195 (10%) | 165 (16%) | 16 (10%) | 2 (3.8%) | 2 **(2.7%)** |

Source: Statistics Canada 2006 Community Profiles (Statistics Canada, 2007).

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[1] Statistics Canada notes: Refers to the mode of transportation to work of non-institutional residents 15 years of age and over who worked at some time since January 1, 2005.

[2] Census agglomeration.

Despite Kelowna's growing size and provincial importance, transit use in the Kelowna CMA remains underdeveloped as compared to Vancouver and Victoria. As seen in Table 1.1, Kelowna lags far behind both the Canadian and British Columbian averages for public transportation use. Only 2.7 per cent of Kelowna residents ride the bus to work compared to 11 per cent of all Canadians and 10 per cent of all British Columbians. Furthermore, the Kelowna CMA has the lowest transit ridership among four of the largest urbanised areas of the province.[3] Considering these statistics, the policy problem central to this study is that transit ridership in Kelowna is too low.

There are a number of reasons why low transit ridership is problematic, particularly in a growing urban centre such as Kelowna. Low transit ridership correlates with a high degree of automobile dependency, most notably in North American cities (Newman and Kenworthy, 1999, 30). Also illustrated in Table 1.1, Kelowna is no exception to this trend and has both the lowest rate of transit usage and the highest rate of automobile use of any of the considered jurisdictions. Automobile dependence places economic, environmental and social constraints on a city. Economically, total costs for automobile infrastructure are 30 to 40 per cent higher than transit system costs and construction of new and wider roads has been shown to be largely neutral toward congestion relief and travel-time savings over the long term (Newman and Kenworthy, 1999, 41). Environmentally, greenhouse gases from auto emissions lead to smog and health concerns for residents of car-centred cities. Furthermore, car-dependent cities face exacerbated urban sprawl, particularly problematic for a city like Kelowna given its situation in a valley with finite agricultural lands. Socially, car-based cities are noisy and have high vehicular accident rates. Liveability is also reduced through a loss of community, as casual interactions among pedestrians and transit users are lost, and urban vitality is diminished as public space becomes

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[3] Admittedly the comparison between the Kelowna *CMA* and the Kamloops *CA* is not ideal, however the IBI Group (2005, 32) confirms the superior transit ridership rate in Kamloops, noting the Kamloops transit system displays a considerably higher passengers per capita count (30.38) than does the Kelowna transit system (21.88).

dominated by cars, as opposed to people (Newman and Kenworthy, 1999, 41). Increased transit counters these negative effects of automobiles.

The Kelowna Regional Transit Authority notes three categories of benefits provided by public transportation: mobility, equity and efficiency (Community Benefits of Transit, website). Providing subsidised, accessible travel options allows for community integration and access to employment and local amenities for those in need of assistance due to age, disability or income. Importantly, Kelowna Regional Transit reports that transit does not automatically confer these benefits, noting underutilisation of transit service can be detrimental to a community (Community Benefits of Transit, website).

In view of the considerable problems that surround heavy reliance on automobiles and the remedies provided by public transportation, attempting to increase the mode share of transit in Kelowna would seem a worthwhile pursuit. Furthermore, the British Columbia Provincial Government has stated a goal of doubling transit ridership in the province by 2020 (Ministry of Transportation, 2008, 17) and the ambitious nature of this goal underscores the importance of improving transit ridership in Kelowna. Kelowna Regional Transit certainly recognises the relevancy and importance of increasing bus ridership and therefore, will most likely be receptive to informed recommendations provided by this study on how to increase transit ridership.

## 1.2    Transit in Kelowna

The Kelowna Regional Transit System is operated by the Kelowna Regional Transit Authority, a local subsidiary of BC Transit that oversees public transportation in Kelowna. It boasts a 30 year history, various community-oriented programs and ongoing service improvements (BC Transit, 2007). Kelowna is recognised as a leader in sustainable transportation practices, one of only four Canadian cities to have 100 per cent of transit buses running on alternative fuel (Union of British Columbia Municipalities, 2008). Problematically, Kohn (2000,

1) notes that sparse population patterns like those found in Kelowna make the provision of public transportation services relatively expensive and providing comprehensive services becomes more difficult. Although the Kelowna CMA is a growing urban centre, development has not brought density. The Kelowna CMA has just 55.9 persons per square kilometre compared to Vancouver's 735.6 and Victoria's 474.7 persons per square kilometre (Statistics Canada, 2007).

*Figure 1.1: Map of Kelowna*
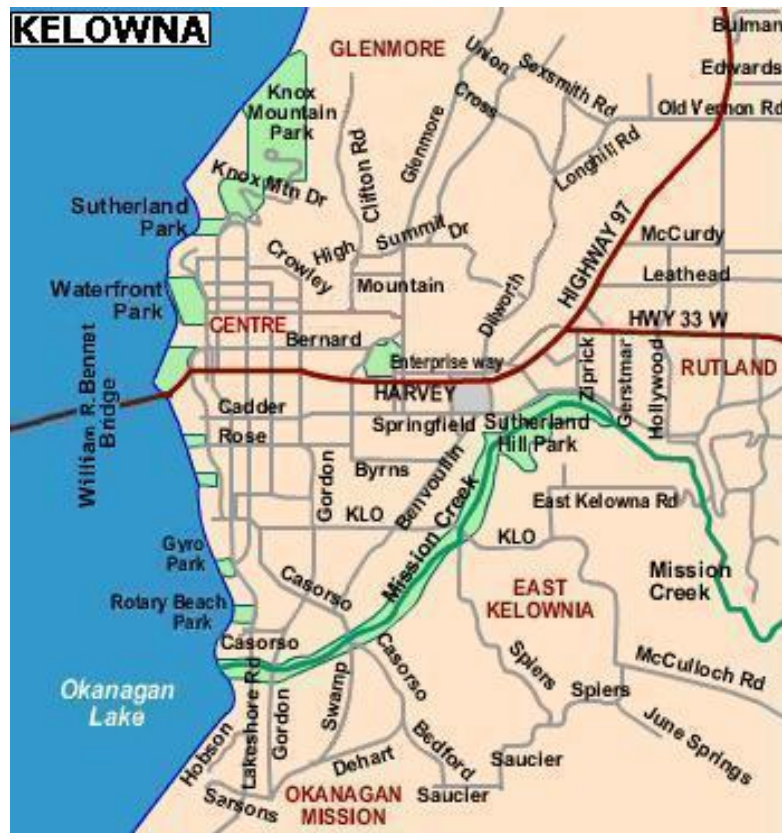


Source: Permission for use granted by GNU Free Documentation License; adapted from original by author

Figure 1.1 displays a map of central Kelowna. Harvey Avenue (Highway 97) serves as the primary traffic artery and is often congested, significantly contributing to excess commute times within the city (MacNaull, 2008). While low transit ridership is problematic for multiple reasons its correlation with traffic congestion is the most salient transportation problem for Kelowna. Traffic congestion is estimated to cost the average Kelowna commuter $521 per year (MacNaull, 2008).

Low satisfaction and frustration with transit in Kelowna is expressed in Letters to the Editor in local newspapers. Letters from Kelowna residents in the December 20 and 23, 2008 editions of the Kelowna Daily Courier complain of slowness of buses, infrequent service and general dissatisfaction with transit given the city's growth and provincial commitments to invest in public transportation (Wheelhouse, 2008; Wall, 2008). A 2008 survey by Kettle Valley Research finds low levels of satisfaction with public transportation services in Kelowna (Kettle Valley Research, 31), a finding reflecting ride share modes previously shown in Table 1.1. The same survey finds 72 per cent of respondents rate traffic congestion levels as high or very high with 67 per cent supporting public transit improvement as a means of mitigating vehicle congestion (Kettle Valley Research, 2008, 29-30). Encouragingly, this survey also finds 48 per cent of Kelowna residents would use their transit system if bus routes and service frequency improved (Kettle Valley Research, 2008, 31). Furthermore, a 2009 City of Kelowna study of approximately 1000 respondents suggests 75 per cent place priority on more walking, cycling and transit opportunities over widening roads for private vehicles (Daily Courier Staff, 2009). Kelowna residents have an appetite to move differently.

## 1.3    Reasons for Low Transit Ridership

There are differing opinions among academics and transportation agencies as to the most important factors affecting ridership levels. Kohn (2000, 2) suggests factors influencing transit ridership are complex, fluctuate and are not easily identified. While this study explores many common reasons influencing Kelowna ridership rates, particular emphasis is placed on the effect of stigma. In "Mobility as a Positional Good", Todd Litman (2007a) discusses how prestige value affects transportation decisions by individuals; automobile travel is considered prestigious, while other modes such as transit are often stigmatised. He notes that "buses are often called loser cruisers…and this stigmatisation reduces use of alternative modes compared to what consumers

would otherwise choose" (Litman, 2007a, 8). Robert Paaswell (1972, 256; 1973, 358-359) also reports transit is stigmatised for its association with the poor.

Some authors further suggest stigma may be a main cause of low transit ridership. For example in "Passenger Perceptions and the Ideal Urban Bus Journey Experience", Stephen Stradling et al. (2007, 283) find concerns of self-image play a role in discouraging people in Edinburgh, Scotland from using transit. The study reports on the responses of Edinburgh residents to a survey on 68 aspects of bus travel that may be unappealing or discourage transit use. The authors report many respondents agree with the statement, "travelling by bus does not create the right impression" and avoid travel by bus as a result (Stradling et al., 2007, 283).

In "Can Public Transport Compete with the Private Car?" Linda Steg (2003) surveys 1800 Netherlanders to determine why public transport is often perceived as a poor alternative to automobiles, and who would be open to use transit more often. Steg finds car users prefer their mode of transport largely due to psychological and cultural meanings. She notes many like to drive for non-utilitarian reasons and that many drivers report feelings of superiority over others as their car is a status symbol (Steg, 2003, 34). In "Car Use: Lust and Must", Steg (2005, 147) also reports car use is more strongly related to symbolic and affective motives than functional purposes and many respondents affirm their car speaks to their character and provides status and prestige over people who commute by other modes such as transit (Steg, 2005, 154). While researchers have investigated low transit ridership in Kelowna the impact of negative stigma has not yet been considered. [4]

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[4] See Ministry of Municipal Affairs and Housing, (1977); Marathon Communications, Inc, (2006); BC Transit, (2007); IBI Group, (2005); Note: IBI Group discusses a 2004 telephone survey conducted in Kelowna where respondents are asked to identify factors that would encourage them to alter transportation behaviour in favour of transit. The report also discusses a 2004 on-board transit survey used to collect data on respondents' use of the transit system and satisfaction with transit service in Kelowna. Requests were made to local officials, however the author was unable to secure access to data sets from previous survey work. Accordingly, an original survey is conducted to gather information.

## 1.4    Summary

Population growth in the Kelowna CMA confers a number of benefits to the city as well as many significant challenges, including transportation of more people and goods within a finite land area. That transit ridership in Kelowna is much lower than Canadian and other jurisdictional averages exacerbates transportation-related challenges for the region. Statistics show transit ridership in Kelowna is less than one third of Canadian and British Columbian averages and the principal consequences include measurable financial losses for local commuters due to traffic congestion and increased municipal infrastructure costs. Although Kelowna offers public transit bus service, area residents remain largely committed to automobile use for getting around town. Research in other jurisdictions demonstrates negative stigma is attached to bus riding and reduces transit ridership and this has not been considered previously in Kelowna. To better understand why few people living in Kelowna use public transit, the next chapter outlines the method by which this research question is investigated.

# 2: Methodology

This study employs a survey of Kelowna residents to better understand factors contributing to transit non-ridership. This chapter describes the overall design of the survey, outlining information gathering techniques, dependent and independent variables and related hypotheses. The 37 included independent variables and their predicted impact on transit use is rooted in findings of previous academic and professional studies. The chapter also explains questionnaire administration. Chapter 3 provides descriptive data and regression results.

## 2.1    Overall Design and Sample

Survey work is a common technique for exploring transit ridership. For example, in "Measuring the Performance of Transit Systems", authors Jarir Dajani and Gorman Gilbert (1978, 100) provide guidelines by which local government should evaluate transit systems. Dajani and Gilbert (1978, 100) suggest wide-scale comparisons with other jurisdictions are not necessary as transit uses take place under relatively stable short-run conditions (e.g.: population density, land-use patterns, employment centre locations), although service trends, cost and ridership information from other municipalities may help illuminate localised problems. Importantly, the authors suggest collecting data from a wide-array of local residents, as "subjective data from surveys of both users and non-users are feasible. That is, [all] citizens can be asked to evaluate transit service attributes" (Dajani and Gilbert, 1978, 100). Following this advice, this study employs a survey directed at both transit users and non-users.

This survey employs intercept sampling as a means of contacting survey respondents. Intercept sampling is neither random nor systematic and does not produce findings that can be generalised in a statistically significant way to a wider population. Unlike methods of random

sampling, intercept sampling does not require participants be randomly chosen from a representative whole. Rather, participant selection involves a certain degree of surveyor bias. While intercept sampling may not be acceptable for surveys designed to determine precise measurements it is well suited to exploratory research interested in gathering information on ridership, demographic characteristics and attitudes about service, as it allows for the collection of a wide-array of data in an inexpensive and time-efficient manner (Shaller, 2005, 60). Intercept sampling is also particularly appropriate in this study as less than three per cent of Kelowna residents use transit (Shaller, 2005, 1). Although intercept sampling can never be truly representative, spatial techniques can be employed to make the survey available to a wider variety of demographic groups. Instead of choosing one survey site, a variety of different sites and survey times can be pre-selected to target a wide demographic variety of respondents (Shaller, 2005, 14). Various sites can be chosen across a municipal region to better reflect regional, social and economic diversity. Furthermore, when sampling for a transportation-based survey, it is imperative to choose survey sites in a variety of areas across the region to reflect differences in potential trip distance, suburban or urban form influences on transportation behaviour and interaction with the existing transportation options (Shaller, 2005, 14).

Intercept sampling has been readily used in professional transit survey work to identify broad trends and themes in individual preference for many purposes, including service planning and marketing (Shaller, 2005, 1). Indeed, intercept (or on-board) sampling has been previously employed in Kelowna (IBI Group, 2005, 16-17). Among other things, information on transit users' trip origin and destination, frequency of transit use, alternative modes available and satisfaction with various components of the transit service were collected.

To perform meaningful statistical analysis, the author deliberately sought out substantially more transit users than would be surveyed under random sampling. According to census data, a sample of 1000 Kelowna residents that includes transit users and non-users would

yield merely 30 bus riders under pure random sampling; information derived from such a small group would not be easily translated to a larger population. To contact more bus riders the author spent a disproportionate amount of time surveying near transit infrastructure, such as the Queensway Transit Mall, relative to other areas of Kelowna where survey work was conducted. Located in downtown Kelowna, Queensway is the main node and one of the primary transfer points for the Kelowna bus system therefore it is the ideal location to contact respondents likely to be largely transit users. Numerous days of survey work were spent at the Queensway Transit Mall over the three-week period of survey collection. Appendix B contains further information regarding survey administration.

## 2.2    Dependent Variable

The dependent variable (the variable in which we seek to explain variation) in this study is residential use of Kelowna transit. The survey questionnaire contains multiple questions by which to measure ridership, each discussed below. The first queries Kelowna residents' main mode of transportation but is not used as the main dependent variable measure in this study as it simply categorizes individuals as car drivers or bus riders and lacks the detail of other measures. For example, responses to question 1 do not indicate whether an individual travels by bus 100 per cent of the time, or simply a majority 51 per cent of the time.

The questionnaire also asks respondents to record how many one-way trips they made by any mode of transportation in the previous week, as well as how many one-way trips they made by bus. The purpose of questions 2 and 3 is to calculate respondents' percentage of total trips made by bus, an ideal scale-based usage measure on which Ordinary Least Squares (OLS) regression techniques can sometimes be used. Unfortunately, many survey respondents misinterpreted these questions, as evidenced by numerous individuals reporting more trips by bus

than by "any mode of transportation."[5] In addition variable distribution is not parametric eliminating the possibility of analyzing data using OLS regression (Field, 2000, 37).[6]

The final question used to capture information regarding bus usage in Kelowna asks respondents to describe their use of the bus service in Kelowna. Provided options include, "I never take the bus", "I only use it sometimes", "I use it a lot, but not for every trip" and "It's my main way of getting around town." This method of querying transportation mode choice is selected as the main dependent variable primarily because there seems to be no misunderstanding of the question by survey respondents and no missing cases. 'Use of the bus in Kelowna' is recoded into the binary form of "I never take the bus" versus all others. Although reducing the number of possible responses from four to two compromises some nuance within the dependent variable, it is rationalised on the grounds that it is those who never take the bus whose behaviour the author seeks to affect above all others.[7] Indeed, this implies that *any* use of public transit is preferable to no bus use. The value of gaining occasional transit users is discussed in the article, "Infrequent Riders: One Key to New Transit Ridership and Revenue", where authors Richard Oram and Stephen Stark (1996) reveal research findings that suggest infrequent riders are a critical market key to building transit ridership (and revenues).

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[5] Evidently, the wording of questions 2 and 3 on the questionnaire was not sufficiently clear; were this study to be conducted again with greater resources and time, the author would recommend further pre-testing of the survey instrument to explore possible wording options that are clear to all.

[6] Of 277 valid cases, nearly half of respondents (152) indicate having taken 0 per cent of their total trips by bus in Kelowna in the week previous to being contacted. After determining that OLS regression is not applicable, this variable was recoded into binary form with non-riders being coded '1' and riders of any type coded '0.' A crosstab was run between this variable and the dependent variable (question 4) in the form employed throughout this study (where non-riders are also coded '1' and riders of any type are coded '0') to determine the nature of the relationship. As expected, the variables are closely related and therefore no further logistic regression models are required.

[7] While a rationale is provided for recoding dependent variable responses into "I never take the bus" versus all others, the author recognises that there are other valid alternatives to this recoding method. Responses could also be reasonably grouped into taking the bus in Kelowna 'never' and 'sometimes' (1) versus 'a lot' and always (0). Crosstabulations between the dependent variable coded in this manner and independent variables, as well as logistic regression analysis, indicate that considerably different findings are elicited from analysis of this dependent variable as compared with those findings discussed in Chapter 3. As such, the author recognises that further study could be conducted with this dataset using different coding methods for the dependent variable, however this possibility is not considered further in this study.

Given the goal of this study is to make informed recommendations for how to increase transit ridership in Kelowna, the behaviour that the author seeks to explain is individuals' *non-ridership* of public transportation: with non-riders being coded '1' and riders of any type coded '0' during statistical analysis. Thus hypotheses between the dependent variable (use of the bus in Kelowna) and independent variables indicate which response for each independent variable is most likely to indicate *non*-ridership of transit.

## 2.3    Independent Variables

This section discusses each independent variable employed in the study, hypothesised relationships with the dependent variable value of non-ridership and sources from which the hypothesis is generated. Tables 2.1-2.4 group independent variables into the following categories: Perceptions and Attitudes, Stigma Indicators, Personal Conditions and Demographics. Chapter 3 contains descriptive statistics for all variables.

### 2.3.1    Perceptions and Attitudes

In "The Importance of Attitudes in the Decision to Use Mass Transit", authors Gorman Gilbert and James Foerster (1977) affirm the merits of using travelers' attitudes and perceptions of public transit systems as an effective means of gathering information to inform policy decisions. The authors test the role attitudinal variables play in an individual's travel decision-making process. They conclude attitudinal variables are important in transportation mode choice decisions, improve the predictive power of models and are particularly beneficial in marketing transit to new users (Gilbert and Foerster, 1977, 321). Improving public transit image includes "soft" or "non-engineering" transit system characteristics such as information availability, appearance and advertising (Gilbert and Foerster, 1977, 322). Much like marketing any other product or service, transit ridership can be increased by improving individuals' perceptions of and attitudes about public transportation.

*Table 2.1: Perceptions and Attitudes variables, hypothesised relationships and sources*

| Name | Measure | Hypothesis[8] | Source(s)[9] |
|---|---|---|---|
| Cleanliness | Buses tend to be clean. | Disagree: + | 1 |
| Information | Getting information is easy/convenient. | Disagree: + | 1, 4 |
| Reliability | Buses reliable/on time. | Disagree: + | 1 |
| Frequency | Buses run frequently enough for me. | Disagree: + | 1 |
| Connections | Good connections/wait times | Disagree: + | 1 |
| Safety at Stops | Waiting at bus stops is safe. | Disagree: + | 1 |
| Safety on Buses | Riding the bus is safe. | Disagree: + | 1, 2 |
| Routes | Bus routes direct/have appropriate stops. | Disagree: + | 1 |
| Punctuality | Get to destination on time. | Disagree: + | 1 |
| Fare Price | Too expensive. | Agree: + | 3 |
| Compared to Car | Takes up too much time | Agree: + | 1, 2 |
| Standing | I won't get a seat /have to stand | Agree: + | 1 |
| Privacy | No privacy/too little personal space | Agree: + | 1 |
| Transporting goods | Hard to transport groceries/other goods | Agree: + | 1 |

Table 2.1 displays independent variables regarding survey respondents' perceptions and attitudes about transit. As in Tables 2.2-2.4, the first column lists variable names and the second notes each variable measure – brief notation of the statements attached to each variable in the survey instrument. The third column notes the direction of the hypothesis attached to each variable. For example it is hypothesised that those who disagree buses in Kelowna tend to be clean are more likely to be non-riders. The fourth column indicates sources from which hypotheses are generated. Many hypotheses are generated based on findings by TransLink (2003); this is appropriate as the report is based on survey work conducted by a professional transit authority and Vancouver residents are assumed to have comparable preferences to Kelowna residents given their proximity. Information is also derived from Stradling et al. (2007), Kohn (2000) and Litman (2007b, 2008c).

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[8] A '+' indicates respondent is not hypothesised be a bus rider.

[9] 1=TransLink, 2003; 2=Litman, 2008c; 3=Kohn, 2000; 4= Stradling et al.

*Table 2.2: Stigma Indicator variables, hypothesised relationships and sources*

| Name | Measure | Hypothesis[10] | Source(s)[11] |
|---|---|---|---|
| Passengers | Bus passengers intoxicated/smell bad | Agree: + | 4 |
| Shame | Don't want to be seen waiting at bus stop | Agree: + | 1, 4, 5 |
| Condescension | People look down on bus riders. | Agree: + | 5, 6, 7, 8, 9 |
| Prestige | People think driving is cooler than bus. | Agree: + | 5, 8, 9, 10 |

## 2.3.2   Stigma Indicators

One of the key hypotheses that this study tests is that stigmatisation of public transit exists in Kelowna and that social concerns of this nature play a role in transportation mode choices there. Table 2.2 displays a special subset of the 'perceptions and attitudes' category of independent variables that focuses specifically on survey respondents' perceptions of negative stigma attached to bus riding. Although social concerns such as stigmatisation are not always examined in explorations of transit ridership, some valuable work on attitudinal concerns of this nature has been done to date. For instance, unwanted interaction with other passengers, particularly intoxicated ones, is shown to dissuade people from riding the bus (Stradling et al., 2007, 291). Following this finding, it is hypothesised that agreement with the statement asserting Kelowna transit users are intoxicated, smell bad, or are otherwise unappealing correlates positively with non-ridership.

Shame associated with bus riding is another aspect of transit-related stigma that discourages ridership (TransLink, 2003, 58; Litman, 2007a, 8-9; Stradling et al., 2007, 283). It is hypothesised that agreement with the statement, "I wouldn't want to be seen waiting at a bus stop in Kelowna" will positively correlate with non-ridership of transit. Multiple questions on stigma are employed to try to get past probable reticence among respondents to confirm existence of

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[10] A '+' indicates respondent is not hypothesised be a bus rider.

[11] 1=TransLink, 2003; 4= Stradling et al., 2007; 5=Litman, 2007a; 6=Paaswell, 1972; 7=Paaswell, 1973; 8=Fisher, 1993; 9=Steg, 2003; 10=Steg, 2005.

transit-related stigma (TransLink, 2003, 58) and indirect questioning is shown to be an effective means of overcoming such reticence (Fisher, 1993, 313). Given the common association between transit use and the poor (Paaswell, 1972, 256; 1973, 358-359) and the connection between transit use and a lack of prestige (Steg, 2003, 34; Litman, 2007a, 8-9) it is hypothesised that agreement with the statement "people in Kelowna look down on bus riders" will correlate positively with non-ridership. Furthermore, private automobiles often provide drivers with feelings of superiority over others (Steg, 2005, 154). Given this finding it is assumed agreement with the statement, "people in Kelowna think driving is cooler than taking the bus" will correlate positively with non-ridership.

*Table 2.3: Personal Conditions variables, hypothesised relationships and sources*

| Variable Name | Variable Measure | Hypothesis[12] | Source(s)[13] |
|---|---|---|---|
| Stop Distance Reasonability | Live in reasonable walking distance from bus stop | No: + | 1 |
| Home Stop Distance | How far do you live from bus stop | More than 10 minutes: + | 1, 11 |
| Destination Reasonability | Primary destination in reasonable distance from bus stop | No: + | 1 |
| Destination Stop Distance | How far primary destination from bus stop | More than 10 minutes: + | 1, 11 |
| Transit System Knowledge | Know the bus system | Not very/not at all familiar: + | 1, 4 |
| Car Access | Access to a car | Yes: + | 1 |
| Driver's Licence | Valid driver's licence | Yes: + | 1 |
| Clean Air Day Awareness | Aware of free transit on annual Clean Air Day | No: + | (Testing program knowledge) |
| ProPASS Program Awareness | Aware of ProPASS Program | No: + | (Testing program knowledge) |

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[12] A '+' indicates respondent is not hypothesised be a bus rider.

[13] 1=TransLink, 2003; 4= Stradling et al., 2007; 11=IBI Group, 2005.

### 2.3.3 Personal Conditions

Table 2.3 displays independent variables that focus on survey respondents' personal conditions that can affect their transportation mode choices, such as how far it is to a transit stop from home. Having transit stops close to home is an important aspect of attracting transit users (TransLink, 2003, 53, 61, 64); given this it is hypothesised that responding negatively to the question, "Would you say that you live within reasonable walking distance from a bus stop?" will correlate positively with non-ridership. TransLink (2003, 53, 61, 64) also notes that Vancouverites rate having transit within two blocks of home as being of high importance. In the Central Okanagan Smart Transit Plan, the IBI Group (2005, 12) also indicates a similar distance (400 metres[14]) as being a typical measure used in the transit industry for the maximum walking distance to a transit stop. Following this, it is hypothesised that Kelowna residents who answer "More than ten minutes" to the question "How far do you live from a bus stop?" will not be transit users. Further information is derived from Stradling et al. (2007) and Kelowna Regional Transit System (2008).

### 2.3.4 Demographics

Table 2.4 displays variables that focus on survey respondents' demographic information relevant to transit use. Information is derived from IBI Group (2005), TransLink (2003), Litman, (2007b), Brown et al. (2001), Sanchez (1999), Community Benefits of Transit (website) and Hensher and Reyes (2000)

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[14] Although TransLink uses city blocks as a measure of distance to transit stops and the IBI Group uses metres, this study employs walking minutes to gauge distance. This approach allows for perceptions of distance to transit stops by non-transit users to be used as relevant data, and also allows those with mobility issues to express longer travel times to transit stops. The IBI Group reports 400 metres as a standard measure in the transit industry for maximum reasonable walking distance to transit stops. The number of minutes of walking required to travel 400 metres was attained using the Walking Directions function on Google Maps, which estimates an average walking speed of 4.8 kilometres per hour. Accordingly, walking 0.4 kilometres (400 metres) is estimated to take approximately 5 minutes. Following the IBI Group's assertion that 400 metres is the industry standard for maximum reasonable distance to transit stops, "Less than 5 minutes" walking was used in the survey instrument for this study as the baseline answer in survey questions 24 and 26.

*Table 2.4: Demographics variables, hypothesised relationships and sources*

| Variable Name | Variable Measure | Hypothesis[15] | Source(s)[16] |
|---|---|---|---|
| Student | Are you a student? | No: + | 1, 11 |
| U-Pass | Are you a U-Pass holder? | No: + | 12. |
| ProPASS | Are you a ProPASS holder? | No: + | 12, 13 |
| Unemployed | Are you unemployed? | No: + | 14. |
| Retired | Are you retired? | Yes: + | 1 |
| Disabled | Are you disabled? | No: + | 15 |
| Gender | Are you female or male? | Male: + | 1 |
| Age | What is your age? | 45 and above: + | 1 |
| Young Children | Are you responsible for a child younger than 16 years of age? | Yes: + | 16 |
| Income | What is your annual household income? | $60,000 and above: + | 1, 11 |

## 2.4    Summary

Using previous transit studies as guides, this study surveys Kelowna bus riders and non-riders to discover why some do not use public transit. Factors hypothesised to influence non-ridership include perceptions and attitudes, stigma, personal conditions and demographics. Based on findings from previous research, a particular response toward each survey question is assumed to correlate with non-ridership of transit. The next chapter discusses survey findings, including descriptive statistics and regression analysis to determine if and how independent variables discussed in this chapter affect survey respondents' use of the bus in Kelowna.

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[15] A '+' indicates respondent is not hypothesised be a bus rider.

[16] (1)=TransLink, 2003; (11)=IBI Group, 2005; (12)=Brown et al., 2001; (13)=Litman, 2007b; (14)=Sanchez, 1999; (15)=Kelowna Regional Transit System, Community Benefits – website; (16)=Hensher and Reyes, 2000.

# 3: Survey Findings

This section outlines findings of survey work outlined in Chapter 2 aimed at discovering why some Kelowna residents do not use the public bus system. This chapter includes sample characteristics, crosstabulation tests and regression results. Findings indicate perceptions and attitudes regarding connections, speed of buses and negative stigma are important factors influencing non-ridership, along with being retired and unfamiliarity with the transit system. These findings are used to generate and evaluate options in subsequent chapters.

## 3.1    Descriptive Survey Findings

The following subsections discuss descriptive findings of the survey of Kelowna residents. The dependent variable and categories of independent variables are discussed separately. Regression analysis results follow.

### 3.1.1    Dependent Variable

The dependent variable employed in this study is respondents' description of their use of the bus system in Kelowna. Options provided to the question "How would you describe your use of the bus in Kelowna?" include (1) "I never take the bus", (2) "I only use it sometimes", (3) "I use it a lot, but not for every trip" and (4) "It's my main way of getting around town." The four answers are combined to provide a binary variable with options 2, 3 and 4 combined to compare to option 1. Thus this study compares "non-riders" (1) to "riders" (0) – those who use it always, a lot or only sometimes.

*Table 3.1: Dependent variable*

| How would you describe your use of the bus in Kelowna? | Frequency | Per cent |
|---|---|---|
| "I never take the bus" | 138 | 41.3% |
| "I only use it sometimes" | 64 | 19.2% |
| "I use it a lot, but not for every trip" | 44 | 13.2% |
| "It's my main way of getting around town" | 88 | 26.3% |
| | | |
| **After Recoding** | | |
| "I never take bus" (Non-rider) | 138 | 41.3% |
| "It's my main way of getting around town", "I use it a lot, but not for every trip" and "I only use it sometimes" (Rider) | 196 | 58.7% |
| Total | 334 | 100% |

As shown in Table 3.1, surveys were collected from 334 Kelowna residents. Of these, 41 per cent are non-riders while 59 per cent are considered bus riders. As explained earlier, these statistics do not reflect actual bus ridership in Kelowna as the survey was collected with disproportionate time spent near transit infrastructure. Findings among the dependent variable are affected by purposeful survey oversampling of bus riders relative to transportation mode share indicated by census data.

### 3.1.2 Independent Variables

Tables 3.2 through 3.5 display descriptive statistics for the 37 'perceptions and attitudes,' 'stigma indicators,' 'personal conditions,' and 'demographic' independent variables. These tables include the descriptions of the predictor and reference categories for each variable, frequency and percentages for these categories. As there are a large number of variables in each variable set, commentary is not offered on each variable but notable findings are discussed. In Appendix C contingency tables offer dependent and each independent variable crosstabulation results, as well as Pearson $Chi^2$ significance tests describing the degree to which variables correlate with transit use. While not discussed in detail here, these tables are important as variables found to be significant using $Chi^2$ tests are included in regression analysis later.

*Table 3.2: Descriptive statistics: Perceptions and Attitudes variables (N=334)*

| Variable Name | Variable Measure[17] | % | Freq. |
|---|---|---|---|
| Cleanliness | **Not clean** | 12.3 | 41 |
| | Clean | 87.7 | 293 |
| Information | **Not easy to get info** | 26.6 | 89 |
| | Easy to get info | 73.4 | 245 |
| Reliability | **Not reliable and on time** | 41.6 | 139 |
| | Reliable and on time | 58.4 | 195 |
| Frequency | **Not frequent enough** | 59.3 | 198 |
| | Frequent enough | 40.7 | 136 |
| Connections | **Connections not good** | 55.7 | 186 |
| | Connections good | 44.3 | 148 |
| Safety at Stops | **Not safe at stops** | 39.8 | 133 |
| | Safe at stops | 60.2 | 201 |
| Safety on Buses | **Not safe on bus** | 15.3 | 51 |
| | Safe on bus | 84.7 | 283 |
| Routes | **Routes not direct** | 38.0 | 127 |
| | Routes direct | 62.0 | 207 |
| Punctuality | **Not on time going by bus** | 53.0 | 177 |
| | On time going by bus | 47.0 | 157 |
| Fare Price | **Bus too expensive** | 32.0 | 107 |
| | Bus not too expensive | 68.0 | 227 |
| Speed Relative to Car | **Too slow versus car** | 78.1 | 261 |
| | Not too slow versus car | 21.9 | 73 |
| Standing | **Will have to stand** | 25.7 | 86 |
| | Will not have to stand | 74.3 | 248 |
| Privacy | **Privacy an issue** | 35.0 | 117 |
| | Privacy not an issue | 65.0 | 217 |
| Transporting Goods | **Too difficult to transport goods** | 68.9 | 230 |
| | Not Too difficult to transport goods | 31.1 | 104 |

Table 3.2 displays descriptive statistics for independent variables measuring respondents'

perceptions and attitudes towards services provided by the Kelowna Regional Transit System.

Attitudes toward other aspects of transit in Kelowna (such as fare prices) are also examined. A

number of notable findings are indicated. Only 12 per cent of respondents think Kelowna buses

tend to be not clean and a mere 15 per cent feel personal security on buses is a problem. Less

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[17] Bold indicates category is hypothesised to correlate with non-transit ridership.

impressive however are results for frequency of service, connections between transit vehicles, speed of buses relative to private automobiles and difficulty regarding transporting goods on the bus. These performance indicators show a majority of respondents perceive the need for improvements in these areas. These findings are generally reflective of transit performance evaluations in other jurisdictions. Indeed, TransLink (2003, 61) finds Vancouver residents assess the cleanliness of transit vehicles notably higher than performance on frequency of service and on offering connections with reasonable wait times.

*Table 3.3: Descriptive statistics: Stigma Indicator variables (N=334)*

| Variable Name | Variable Measure[18] | % | Freq. |
|---|---|---|---|
| Passengers | **Passengers unappealing** | 43.1 | 144 |
| | Passengers not unappealing | 56.9 | 190 |
| Shame | **Ashamed of bus** | 18.0 | 60 |
| | Not ashamed of bus | 82.0 | 274 |
| Condescension | **People look down on bus riders** | 38.9 | 130 |
| | People do not look down on bus riders | 61.1 | 201 |
| Prestige | **Driving is cooler than bus** | 67.7 | 226 |
| | Driving not cooler than bus | 32.3 | 108 |

Table 3.3 displays descriptive statistics for the special subset of 'perceptions and attitudes' category of independent variables measuring respondents' perceptions of negative stigma attached to public transit use. Importantly, survey findings indicate the presence of some negative social stigma attached to bus riding in Kelowna. Indeed, 43 per cent perceive bus riders to be unappealing, 18 per cent indicate the desire not to be seen waiting at a bus stop in the city, 39 per cent agree that people in Kelowna look down on bus riders, and, perhaps most notably, a majority 68 per cent of survey respondents agree that "people in Kelowna think driving is cooler than taking the bus." While these findings are worthy of note and somewhat unfortunate, they are not particularly surprising given findings of previous studies discussed previously that indicate

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[18] Bold indicates category is hypothesised to correlate with non-transit ridership.

public transit is often stigmatised. Indeed, survey results are generally reflective of reports from previous study elsewhere, including Stradling et al. (2007) who find many see bus riders as unappealing and Steg (2003, 2005) who finds transit users are looked down upon by car drivers using their vehicle as a status symbol. TransLink (2003) also finds shame of transit use to be a relevant factor for some.

*Table 3.4: Descriptive statistics: Personal Conditions variables (N=334)*

| Variable Name | Variable Measure[19] | % | Freq. |
|---|---|---|---|
| Stop Distance Reasonability | **Do not live close to bus stop** | 19.5 | 65 |
| | Live close to bus stop | 80.5 | 269 |
| Home stop distance[20] | **Live more than 10 min. from stop** | 20.3 | 67 |
| | Live 5-10 min. from stop | 25.8 | 85 |
| | Live less than 5 min. from stop | 53.9 | 178 |
| Destination Reasonability | **Destination not close to bus stop** | 19.5 | 65 |
| | Destination close to bus stop | 80.5 | 269 |
| Destination Stop Distance[21] | **Dest. more than 10 min. from stop** | 20.3 | 64 |
| | Dest. 5-10 min. from stop | 29.2 | 92 |
| | Dest. less than 5 min. from stop | 50.5 | 159 |
| Transit System Knowledge | **Not very or not at all familiar** | 41.0 | 137 |
| | Somewhat or very familiar | 59.0 | 197 |
| Car Access | **No car access** | 70.4 | 235 |
| | Yes car access | 29.6 | 99 |
| Driver's Licence | **No valid driver's licence** | 76.3 | 255 |
| | Yes valid driver's licence | 23.7 | 79 |
| Clean Air Day Awareness | **Not aware of Clean Air Day** | 71.3 | 238 |
| | Aware of Clean Air Day | 28.7 | 96 |
| ProPASS Program Awareness | **Not aware of ProPASS Program** | 88.0 | 294 |
| | Aware of ProPASS Program | 12.0 | 40 |

Table 3.4 displays descriptive statistics for independent variables measuring survey respondents' personal conditions. Notably, 20 per cent of respondents indicate bus stops are not

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[19] Bold indicates category is hypothesised to correlate with non-transit ridership.

[20] Sample reduced as a result of excluding "Don't know" responses, as per TransLink (2003, 52) therefore N=330.

[21] Sample reduced as a result of excluding "Don't know" responses, as per TransLink (2003, 52) therefore N=315.

within what they regard to be reasonable walking distance from their home and their primary destination within the city. Furthermore, 20 per cent also indicated more than ten minutes walking distance to bus stops both from home and their primary destination. Regarding results for tests of Kelowna Regional Transit program knowledge, 71 per cent were unaware of free transit on Clean Air Day and 88 per cent did not know about the ProPASS program. This is particularly disappointing considering the survey sample is artificially skewed towards transit users.

Table 3.5 displays descriptive statistics for independent variables measuring demographic characteristics. Multiple notable results are indicated here; firstly, there is a substantial discrepancy between the number of respondents who report being a student (82) and the number who report having a U-Pass (23).[22] As noted, the U-Pass program in effect in Kelowna requires all University of British Columbia Okanagan students to purchase deep-discount transit passes each semester that offer unlimited bus rides. There are multiple possible explanations for this discrepancy. First, some survey work was conducted at Okanagan College which does not participate in the U-Pass program with the Kelowna Regional Transit System.[23] Still, UBC-O has a substantially larger student population than does Okanagan College, and given that survey work was conducted at campuses of both institutions, one would expect that UBC-O students (U-Pass holders) would comprise the great majority of the sample. Another possible explanation is that some UBC-O students who have U-Passes are unaware of the name of the pass they possess; this hypothesis is rooted in the newness of the U-Pass in Kelowna, as it has only been in effect for one full scholastic year. While not necessarily surprising (given low numbers regarding awareness of the program), it is also unfortunate only 1.5 per cent of survey respondents are ProPASS holders.

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[22] Given that the survey sample is comprised of individuals eighteen years of age and older, there should not be any high school students included within the survey sample. The crosstab between Student and U-Pass indicates that of 23 respondents who indicated having a U-Pass, 16 are students and 7 are not. Among the 311 who indicated not having a U-Pass, 66 are students and 245 are not.

[23] Sprott-Shaw Community College has a campus in Kelowna; this institution also does not participate in the U-Pass program.

*Table 3.5: Descriptive statistics: Demographics variables (N=334)*

| Variable Name | Variable Measure[24] | % | Freq. |
|---|---|---|---|
| Student | **Not student** | 75.4 | 252 |
| | Student | 24.6 | 82 |
| U-Pass | **Not U-Pass holder** | 93.1 | 311 |
| | U-Pass holder | 6.9 | 23 |
| ProPASS | **Not ProPASS holder** | 98.5 | 329 |
| | ProPASS holder | 1.5 | 5 |
| Unemployed | **Not unemployed** | 93.1 | 311 |
| | Unemployed | 6.9 | 23 |
| Retired | **Retired** | 14.7 | 49 |
| | Not retired | 85.3 | 285 |
| Disabled | **Not disabled** | 93.7 | 313 |
| | Disabled | 6.3 | 21 |
| Gender | **Male** | 46.1 | 154 |
| | Female | 53.9 | 180 |
| Age | **45 and above** | 42.2 | 141 |
| | 25-44 | 28.1 | 94 |
| | 18-24 | 29.6 | 99 |
| Young Children[25] | **Yes child younger than 16** | 16.8 | 54 |
| | No child younger than 16 | 83.2 | 268 |
| Income[26] | **$60,000 and above** | 35.3 | 104 |
| | $20,000-59,999 | 38.0 | 112 |
| | $0-19,999 | 26.8 | 79 |

## 3.2    Regression Analysis Findings

This section discusses findings of regression analysis designed to estimate which factors contribute to non-ridership of transit in Kelowna. Field (2000, 163) notes "logistic regression is multiple aggression but with an outcome variable that is a categorical dichotomy and predictor variables that are continuous or categorical." In other words, logistic regression predicts which of two categories an individual is likely to belong to (bus rider or non-rider) given particular other

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[24] Bold indicates category is hypothesised to correlate with non-transit ridership.

[25] Some survey respondents did not respond to the query regarding care for young children, therefore N=322.

[26] Numerous survey respondents did not disclose annual household income, therefore N=295. No action taken to compensate (e.g. insert median or mean income), based on desire of author to minimise manipulation of sample.

data and information. Logistic regression is especially good at eliminating variables that are not a significant influence on the dependent variable.

Table 3.6: Logistic Regression: Significant variables (N=295)

| Variable Name | Category | Beta | Standard Error | Exp(B) | Sig. at .05 |
|---|---|---|---|---|---|
| Cleanliness | Not clean | -.791 | .954 | .454 | |
| Information | Not easy to get info | -.127 | .529 | .881 | |
| Reliability | Not reliable | .369 | .548 | 1.447 | |
| Frequency | Not frequent enough | -.081 | .575 | .922 | |
| Connections | Not good | 1.404 | .610 | 4.072 | *** |
| Safety at Stops | Not safe at stops | .210 | .560 | 1.233 | |
| Safety on Buses | Not safe on bus | .858 | .800 | 2.357 | |
| Routes | Routes not direct | .477 | .557 | 1.611 | |
| Speed Relative to Car | Too slow versus car | 1.655 | .707 | 5.232 | *** |
| Transporting Goods | Too difficult to transport goods | -.093 | .597 | .911 | |
| Shame | Ashamed of bus | 1.825 | .792 | 6.204 | *** |
| Condescension | People look down on bus riders | -.571 | .598 | .565 | |
| Stop Distance Reasonability | Do not live close to bus stop | .654 | .635 | 1.924 | |
| Destination Reasonability | Destination not close to bus stop | -.111 | .606 | .895 | |
| Transit System Knowledge | Not very or not at all familiar | 2.780 | .507 | 16.126 | *** |
| Car Access | No car access | 19.184 | 3518.003 | 2.145 | |
| Driver's Licence | No valid driver's licence | 1.717 | 1.441 | 5.566 | |
| Clean Air Day Awareness | Not aware of Clean Air Day | .401 | .511 | 1.493 | |
| Student | Not student | -.710 | .807 | .492 | |
| U-Pass | Not U-Pass holder | 1.574 | 1.046 | 4.827 | |
| Unemployed | Not unemployed | 2.524 | 1.692 | 12.475 | |
| Retired | Retired | 1.788 | .818 | 5.980 | *** |
| Disabled | Not disabled | 1.116 | 1.201 | 3.054 | |
| Age | 45 and above | — | — | — | |
| | 25-44 | .000 | .592 | .999 | |
| | 18-24 | -.783 | .761 | .457 | |
| Income | $60,000 and above | — | — | — | |
| | $20,000-59,999 | -.574 | .480 | .563 | |
| | $0-19,999 | -1.210 | .848 | .298 | |
| Constant | | -29.103 | 3518.004 | .000 | |

Percentage dependent variable category predicted correctly: 88.5
Nagelkerke Pseudo $R^2$: .774

The regression model presented in Table 3.6 contains only variables found to be significant through Pearson Chi$^2$ significance tests between the dependent and independent variables (see Appendix C for tests). Although not ideal, this method is used as the sample size does not afford sufficient degrees of freedom to allow all variables to be included. The regression model includes 25 of a possible 37 independent variables and is performed on 295 cases. Nagelkerke pseudo $R^2$ scores indicate the model explains approximately 77 per cent of the variability in the dependent variable; the model also correctly categorizes 88.5 per cent correct of the included cases. These scores indicate that in combination, the included independent variables are strong predictors of non-ridership within the sampled population.

The beta values (or logits) in Table 3.6 are important in that their sign indicates the direction of the relationship between the independent variable and the dependent variable (Pallant, 2005, 176). The 'Exp(B)' column notes values for the odds ratios for each independent variable. The odds ratios represent the increase or decrease in odds of those in predictor categories being a non-rider compared to those in the reference category (Pallant, 2005, 176).[27] To interpret odds ratios, 1 is subtracted from the Exp(B) score with the result multiplied by 100 (Pallant, 2005, 176). Given that most independent variables in this study have only two categories, 'an increase in one unit' simply generally refers to changing from one category to the other (e.g.: from "agree" to "disagree"). In other words, the odds ratios indicate the degree to which respondents are more likely to not ride the bus depending which category (agree or disagree) is indicated for each independent variable.

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[27] For categorical variables with more than two categories, multiple predictor categories are compared with a single reference category (Pallant, 2005, 176).

Five of the twenty-five variables included in the model are significant at the 95 per cent confidence level: Connections, Speed Relative to Travel by Car, Shame, Transit System Knowledge and being Retired. More specifically:

- Poor connections result in lower ridership. Those who disagree that the bus system in Kelowna has good connections with reasonable waiting times at transfer points are 300 per cent [100(4.072-1)] or approximately 3 times more likely than those who agree connections and wait times are reasonable to not ride the bus.

- Slow buses result in lower ridership. Those who agree that taking the bus in Kelowna takes up too much time compared to car driving are 400 per cent [100(5.232-1)] or approximately 4 times more likely than those who disagree with this statement to not ride the bus.

- Negative stigma results in lower ridership. Those who agree with the statement "I wouldn't want to be seen waiting at a bus stop in Kelowna" are 500 per cent [100(6.204-1)] or approximately 5 times more likely than those who disagree with this statement to not ride the bus.

- Unfamiliarity with the bus system results in lower ridership. Those who answered the question "How well do you know the bus system in Kelowna" with "not very familiar" or "not at all familiar" are 1500 per cent [100(16.126-1)] or approximately 15 times more likely than those who answered "somewhat familiar" or "very familiar" to not ride the bus.

- Retired people are not riding the bus. Those who are retired are 500 per cent [100(5.980-1)] or approximately 5 times more likely than those who are not retired to not ride the bus.

When reviewing regression analysis findings, it is also important to take note of which variables were found not to have a statistically significant effect on ridership. For instance, "Frequency" of bus service was not found to be a primary influence on non-ridership of the Kelowna Regional Transit System. Indeed, while a majority of survey respondents (59 per cent) indicated that buses do not run frequently enough for their needs, when taken into account with all independent variables of importance, bus frequency does not influence bus ridership in a statistically significant way. The same can be said for "Safety at Stops." While it is indicated in Table 3.2 that 40 per cent of respondents perceive waiting at bus stops in Kelowna to be unsafe, this variable was not found to be significant in regression analysis. Also, while a majority of respondents (69 per cent) perceive transporting goods on the bus to be too difficult, this was not found to be a significant determinant of transit use in Kelowna, nor was reasonability of distance to transit stops from both home and destinations about town. This is surprising, given the amount of attention that tends to be given by transit agencies to transit stop placement (TransLink, 2003, 53, 61, 64; IBI Group, 2005, 12). It is also surprising that Income was not found to have a significant affect on transit ridership given the noted correlation between low household income and utilisation of public transportation (IBI Group, 2005, 17; TransLink, 2003, 67), however this finding may be attributable to a lack of nuance afforded to this variable through recoding of responses for the purpose of minimising usage of degrees of freedom. Access to a vehicle was also not found to be a statistically significant determinant of transit use; further discussion of findings with respect to "Car Access" is presented in Appendix D.

## 3.3   Summary

In summary, results from the Kelowna transit survey yield important findings relevant to local policy-makers. Descriptive statistics indicate the majority of respondents think buses in Kelowna are clean and safe. Other performance indicators are less encouraging however, including unfavourable perceptions of frequency of service and connections between transit

vehicles. Importantly, this study sheds new light on negative stigma attached to bus riding in Kelowna. A considerable minority of respondents perceive bus riders to be unappealing, are (or would be) ashamed riding the bus and many also agree that people in Kelowna look down on bus riders. Furthermore, a majority agree that "people in Kelowna think driving is cooler than taking the bus."

Regression analysis on survey data concerning transit use in Kelowna yields the more conclusive findings with respect to non-bus riding. While there are a multitude of factors that can affect transit ridership in a given jurisdiction, regression analysis shows five factors have a statistically significant effect on respondents' use of the bus in Kelowna:

- Poor connections result in lower ridership.

- Slow buses result in lower ridership.

- Negative stigma results in lower ridership.

- Unfamiliarity with the bus system results in lower ridership.

- Retired people are not riding the bus.

These findings are generally consistent with those of other transit studies; indeed, TransLink (2003) notes Vancouver residents place particular priority on information availability, connections between transit vehicles and overall speed of travel, and also that retired persons are a demographic group whose members may be particularly reticent to use public transportation. Special note must be given however to the finding that negative stigma attached to bus riding is a statistically significant barrier to transit use among those Kelowna residents surveyed. Of 37 possible factors, Shame associated with bus riding is among the five variables found to be most important. This result has important implications for marketing transit in Kelowna, indicating possible approaches to and need for greater public communication.

The next chapters utilise findings from the survey results and statistical analysis to develop and assess policy options for increasing transit ridership in Kelowna. Policy options are proposed and evaluated based on a number of criteria: cost, effectiveness, administrative ease and public acceptability. Of the four criteria considered, findings presented in this chapter inform evaluations of policy option effectiveness.

# 4: Criteria and Measures

This study puts forward policy options for increasing transit ridership in Kelowna. This chapter discusses the criteria and measures used to assess policy options including cost, effectiveness, administrative ease and public acceptability. Table 4.1 defines the criteria and subsequent subsections provide further details on the relevance and measures of each. Policy options are ranked in terms of each criterion from 1 to 5, where 1 is the least preferred option.

*Table 4.1: Criteria and measures for assessment of policy options*

| Criterion | Definition | Measure |
|---|---|---|
| Cost | Figures for cost include capital, implementation and operating costs. Where information is insufficient to accurately estimate costs, approximations are provided. | Ranking (/5) based on chronology (highest to lowest) of actual and estimated costs in Canadian dollars. |
| Effectiveness | The degree to which each alternative is expected to increase ridership on the Kelowna Regional Transit System. | Ranking (/5) based on regression coefficient scores, literature review and key informant comments. |
| Administrative Ease | Anticipated difficulties in implementing and administrating options based on experiences in other jurisdictions and consultation with local transit officials at the City of Kelowna and BC Transit staff. | Rankings (/5) provided by key informants; rankings averaged to produce a single score. |
| Public Acceptability | Public reaction to policy option. Includes consideration of relevant equity implications, if any. Based on experiences in other jurisdictions and consultation with local transit officials at the City of Kelowna and BC Transit staff. | Ranking (/5) provided by key informants; rankings averaged to produce a single score. |

## 4.1    Cost

Cost is a principal consideration for any level of government or publicly funded transit agency in making policy decisions. This criterion includes capital, implementation and operating costs. Where there is insufficient information to accurately estimate costs, approximations are provided. Policy options are ranked in terms of cost in chronological order (from highest to lowest) from 1 to 5, where 1 is the most expensive (and therefore least preferred) option. Cost figures are based on actual and estimated costs in Canadian dollars.

Given recommendations are directed at the Kelowna Regional Transit Authority, cost figures are provided for this local perspective. While it is recognised that funding for the Kelowna Regional Transit System is provided by the City of Kelowna, the Regional District of Central Okanagan, the District of Lake Country and BC Transit, the fact of such cost sharing does not affect this criterion and only aggregate costs are discussed. Also, given that the policy options presented in this study aim to increase ridership on Kelowna transit, implementation and operating costs would be partially offset by any increases in revenues from increased fare collection. It is unclear however precisely how much revenues will increase following potential implementation of a specific policy option. Although it is recognised that costs will be partially mitigated by new fare revenues, the effectiveness criterion serves as the principal measure of increased riders.

## 4.2 Effectiveness

In addition to cost, the most important consideration for policy makers in taking on policy changes or new programs is how effective a given option will be towards its stated aims; the higher the effectiveness the better. The effectiveness criterion gauges the degree to which each alternative is expected to increase ridership on the Kelowna Regional Transit System. Measures are based on literature review, consultation with key informants and coefficient scores from regression analysis findings from the survey of Kelowna residents. Regression coefficient scores are taken from logistic regression results. Policy options are ranked in terms of effectiveness from 1 to 5, where 1 is the least effective (and therefore least preferred) option.

## 4.3 Administrative Ease

Another important consideration in making policy changes is how much work is required for preparation and successful implementation of a given option. This criterion accounts for

anticipated difficulties in implementing and administrating options, as well as time horizons for implementation, where appropriate. Scores are based on experiences in other jurisdictions and consultation with City of Kelowna staff and BC Transit staff, two of the key groups in implementing potential policy changes concerning transit in Kelowna. Policy option rankings (/5) are provided by key informants, including Tania Wegwitz, Corporate Business Development Manager, BC Transit, Anita Wasiuta, BC Transit Marketing and Communications, Jerry Dombowsky, Transportation Demand Supervisor, City of Kelowna and Mike Kittmer, Active Transportation Coordinator, City of Kelowna. Key informants provide a ranking for each option on a scale of 1 to 5, with 1 being the least preferred option. Administrative ease rankings from all key informants are averaged (and rounded) to produce a single score for each policy option.

## 4.4    Public Acceptability

This criterion helps to evaluate policy options based on estimation of public reaction to potential implementation of each policy option. It also takes into account consideration of relevant equity implications, if there are any.[28] Evaluation of public acceptability of policy options is based on experiences in other jurisdictions and consultation with City of Kelowna staff and BC Transit staff. City of Kelowna staff and BC Transit staff are the most appropriate contacts for estimating public acceptability of potential changes to transit policy in Kelowna, as there are no formal stakeholder interest groups in Kelowna that relate to public transportation. City of Kelowna staff are engaged with and informed by Kelowna City Council, while BC Transit staff members have expertise through managing public relations for transit systems across British Columbia. Key informants provide a ranking of each option on a scale of 1 to 5, with 1 being the

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[28] Although key informants were requested to make note of any problematic equity considerations, none were put forward to the author, therefore it is hesitantly assumed that none of the presented policy options involve problematic equity tradeoffs. Admittedly, key informants contacted are not necessarily the ideal counsels on equity implications of policy changes given their respective specialisations in engineering, business development and marketing. However given budget and time constraints, those key informants contacted are the best available sources on equity implications of policy implementation.

least preferred option. Public acceptability rankings from all key informants are averaged (and rounded) to produce a single score for each policy option.

## 4.5 Summary

Cost, effectiveness, administrative ease and public acceptability are used as criteria to evaluate policy options for increasing transit ridership in Kelowna. Of these four criteria, cost and effectiveness are considered to be of paramount importance by the author. Indeed, a given policy proposal may only be realistic if the associated costs are feasible for the implementing body (based on revenues and support from other levels of government), while a high degree of effectiveness justifies policy action in the first instance. Administrative ease and public acceptability are also important considerations in evaluating policy changes as these criteria allow for comparisons to be made between options with respect to implementation and administration difficulty and whether options are generally tolerable for taxpaying members of the public. Criteria are not assigned additional weight however due to the author's desire not to unnecessarily increase subjectivity in the evaluation process.[29] The following chapters discuss evaluation of policy options based on the criteria outlined in Chapter 4.

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[29] The cost and effectiveness criteria were also not assigned additional weight for the simple fact that doing so does not alter the numeric sequence of the policy options evaluation scores. For example, if cost and effectiveness were weighted to double the scores for each criterion, service information dissemination would remain the option with the most preferred score.

# 5:  Policy Options

The policy options discussed in this section are directed at the Kelowna Regional Transit Authority and are informed by interviews and various policy documents. The aim of proposed options is to increase transit ridership in Kelowna and to encourage public transit use, not to constrain use of other transportation modes. Options include proposals oft-cited elsewhere, existing plans for Kelowna and practices in place other jurisdictions. Options are considered if adoption and implementation is within the jurisdictional competence of the governing bodies that make substantive decisions regarding transit in the Kelowna CMA.[30] Table 5.1 briefly details the policy options considered and a detailed explanation of each follows.[31] In Chapter 6 options are assessed on the basis of cost, effectiveness, administrative ease and public acceptability.

*Table 5.1: Policy options defined*

| Option | Explanation |
|---|---|
| (1) Status Quo | No change, current policies and practises remain in place. |
| (2) Express Buses | Implement rapid bus service along principal Kelowna travel corridor (Harvey Avenue/Highway 97) *as per existing plans* under RapidBus BC. |
| (3) Increased Service | Increase rate of acquisition of new transit vehicles for improvements to connections between transit vehicles, as well as frequency of service and transit route offerings. |
| (4) Service Info. Dissemination | Use low and high tech measures to improve Kelowna Regional Transit's service information dissemination. |
| (5) Increased Advertising | Develop advertising campaigns to combat bus-riding stigma. Create and distribute informational pamphlets directed at Kelowna retired people. |

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[30] Kelowna City Council, Regional District of Central Okanagan and Lake Country Council.

[31] Fare-free bus service was also considered as a policy alternative as it is an oft-cited proposal for increasing transit ridership (see Storchmann, 2004, and Perone and Volinski, 2002). Evaluation and consultation with key informants indicates that fare-free bus service in Kelowna is ill-advised and does not warrant further investigation. The option scores poorly overall relative to other options considered; the cost of this option is particularly problematic, as revenues lost to abolishing fares would amount to $4,800,000 in 2009 (Tania Wegwitz, Consultation, 2/26/09).

## 5.1 Option 1: Status Quo

This section discusses current transit policies and practices in Kelowna. It also provides the context in which policy changes would take place. Preserving the status quo is an option for the Kelowna Regional Transit Authority worth exploring and it also serves as a base from which to compare and evaluate other proposed policy options.

Public transportation services in Kelowna are provided by the Kelowna Regional Transit System. The system has annual operating costs of approximately $13 million (IBI Group, 2005, 82-83) and posted overall ridership figures for 2007 of 3.7 million passengers (BC Transit, 2008). However per capita transit ridership in Kelowna (2.7 per cent) is very low relative to Canadian and British Columbian averages and transit ridership levels found in other large British Columbia urban centres. Substantive decisions about transit in the Kelowna region (fares, routes and service levels) are made jointly by Kelowna City Council, the Regional District of Central Okanagan and Lake Country Council; these decisions are made based on information and planning provided by BC Transit's Municipal Systems Program (Kelowna Regional Transit System, website). Buses and other transit vehicles are operated by Farwest Transit Services Inc.

Transit service is available in Kelowna six days a week from 6:00 am until past midnight, and on Sundays and holidays from 7:00 am to 10:30 pm (Kelowna Regional Transit System, 2008, Kelowna Rider's Guide, 1). Frequency intervals on weekdays range from approximately 15 to 120 minutes and on weekends from 30 to 240 minutes (IBI Group, 2005, 11). All routes offer exterior bicycle racks and fully-accessible service via low-floor buses. Transit vehicles in Kelowna include conventional buses, community shuttles and HandiDART service. Illustrated in Figure 5.1, the Kelowna Regional Transit System currently offers twenty-three routes in Kelowna, West Kelowna (formerly known as Westside), Peachland and Lake Country; thirteen of these routes serve central Kelowna.

*Figure 5.1: Map of central transit routes, Kelowna Regional Transit System*
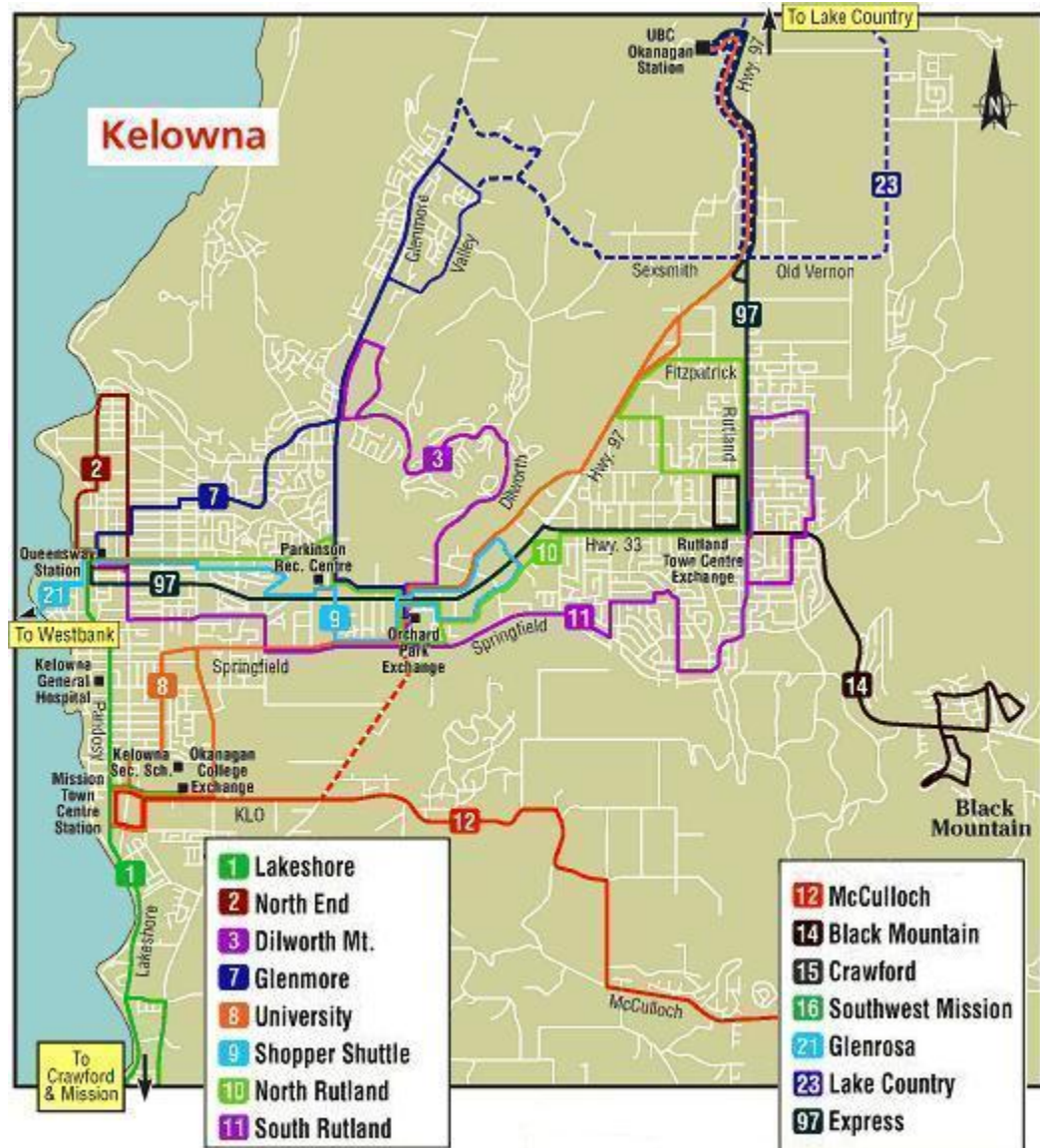


Source: Used by permission of BC Transit; modified for size and presentation by author

Fare payment options on Kelowna Transit include exact coin fare, single-use tickets and a variety of multi-use passes. The system honours BC Bus Passes, and offers various monthly passes and day passes. Kelowna Transit also offers a number of deep-discount passes: the University of British Columbia Okanagan participates in a U-Pass program, where all students are required to contribute $50 per semester for unlimited bus rides; the ProPASS program offers bus passes at a discounted rate to groups with three or more people at a place of work using monthly passes (Kelowna Regional Transit System, 2008, Kelowna Rider's Guide, 21).

*Figure 5.2: Map of service area, Kelowna Regional Transit System*

The Kelowna Regional Transit system employs a single-zone fare structure, meaning that all travel within the service area depicted in Figure 5.2 (between the District Municipality of Lake Country and the Municipality of Peachland) is for a single price, a distance spanning approximately 60 kilometres. Passengers who require two or more buses to complete their trip are

entitled to free transfers upon request from bus drivers. These transfers are good for travel in any direction for 90 minutes (Kelowna Regional Transit System, 2008, Kelowna Rider's Guide, 37).

There are currently a number of initiatives in Kelowna aimed at attracting riders to the transit system. Kelowna Regional Transit operates the Ambassador Program, which staffs Transit Ambassadors to educate Kelowna residents on how to use their local transit system (Ambassador Program, website). Transit Ambassadors appear at community activities including parades, trade fairs and other community events. Ambassadors also visit local schools to teach students about public transit history, passenger skills, life skills and the existing partnership with local police that offers safety for youth on transit and peace of mind for parents and guardians (Other Programs, website).

There are also a number of outreach programs in Kelowna that aim to attract particular population segments onto transit. Family travel is encouraged by offering parents and guardians of youth age twelve and younger free transit on weekends and holidays, and if the parent or guardian is traveling with a pass (as opposed to one-time coin payment) on weekdays (Other Programs, website). High school students in their graduating year are also encouraged to travel by transit as a means of counteracting driving under the influence during celebrations. The GradPass program allows grade 12 students to ride transit vehicles free of charge for any two consecutive days in June with a special pass distributed through schools in May of each year (GradPass Program, website).

The Kelowna Regional Transit System website offers basic information for new users, such as where buses run, schedules by route, bus fares and use of transfers. Also listed is information on boarding buses safely, how to secure baby strollers, and priority seating offered to seniors and to those with disabilities and/or young children (How to Use Your Transit System, website). Safety on the bus is also outlined, including how to safely exit the bus. Notably though,

the website does not feature a trip-planning function to provide users with point to point travel directions by transit (Kelowna Regional Transit System, website).

## 5.2    Option 2: Express Buses

Option 2 considers the existing plans for implementing express buses in Kelowna. This option is considered separately from the status quo as express buses are not yet operational in Kelowna and implementation of express buses will signify a considerable change in transit service provision in Kelowna relative to the status quo. Bus Rapid Transit (BRT) is an increasingly popular form of rapid transit technology given its favourable ratio of high quality service to low cost relative to other forms of rapid transit (IBI Group, 2005, 4). Currently, the City of Kelowna and its regional partners have a BRT plan which includes introducing 12 double-decker buses to service the area between West Kelowna and UBC Okanagan (Transit Expansion, website).

Existing plans call for BRT services to be phased in over the next two years beginning in the fall of 2009. Ongoing work is taking place in Kelowna to implement a traffic signal bus priority system, where GPS transponder units installed in buses would hold traffic signals green to allow approaching buses to travel through intersections along Harvey Avenue before changing to red (Open House, 2008, 14). Stop spacing on BRT routes in Kelowna would be 800-1500 metres (as compared to 200-400 metres on conventional bus routes), with frequent service intervals (10-15 minutes) during peak hours (Open House, 2008, 15). Altogether, BRT is said to offer transit users speedier service as it has few or no stops between main stations and priority movement in traffic (Ministry of Transportation, 2008, 11). Again, the express bus policy option is intended to evaluate these existing plans.

## 5.3    Option 3: Increased Service

In this policy option the Kelowna Regional Transit Authority accelerates annual bus acquisitions. A number of important service improvements would be more easily implemented simply by getting more transit vehicles on the road, including better connections between transit vehicles at primary nodes (such as the Queensway Transit Mall, Orchard Park Exchange and Rutland Town Centre Exchange), transit stations and other transfer points. Other service improvements could include increased frequency of bus service on existing routes, extended evening and early-morning service hours and possible new transit route offerings.

It is assumed that the Kelowna Regional Transit Authority acquires 2.4 new (40 foot) buses per year on average.[32] This option proposes that Kelowna Regional Transit increase the rate of acquisition of new buses to 4 per year, or an incremental increase of 1.6 buses. This is a moderate increase but doing so would allow for many improvements to transit service in Kelowna, most notably with respect to connections.

Acquiring more buses is a common proposal for increasing transit ridership. Indeed, transit drivers in Vancouver recently made a public demand for 500 new buses (CBC News, 2009). Drivers' union representatives note that in 1994 Metro Vancouver had one bus for every 1,200 residents, but that has slipped to one bus for every 1,800 residents; they also note that Toronto and Montréal have one bus for every 1,200 residents today which allows for greater frequency of service there. By comparison, Kelowna has approximately one bus for every 2,514 area residents.[33] In other words, the Vancouver region has nearly 50 per cent more buses per capita than Kelowna, while Toronto and Montréal have 100 per cent more (or double) the per

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[32] The Central Okanagan Smart Transit Plan (IBI Group, 2005, 85) notes that as of 2004, Kelowna had 58 buses in total. The Smart Transit Plan projected that the total number of buses would increase to 70 by 2009; this equates to an average rate of 2.4 new (40 foot) buses acquired per year between 2004 and 2009.

[33] This figure is derived by dividing the projected 2009 population of the Kelowna CMA (176,000 [assumes annual growth of approximately 3 per cent since 2006 census performed]) by the total number of buses (70) projected to be in service in Kelowna in 2009 (IBI Group, 2005, 85).

capita bus count of Kelowna. While a smaller community like Kelowna cannot be expected to offer the same level of transit service as the three major urban centres in Canada, this comparison sheds light on the need for improvements to transit coverage in Kelowna.

## 5.4    Option 4: Service Information Dissemination

This option suggests a continuum of improvements to the service information dissemination capacity of Kelowna Regional Transit through the use of multiple new tools, all of which are employed by other transit agencies elsewhere. The aim of this option is to build transit ridership in Kelowna by making it easier and more convenient to become familiar with transit in advance of one's initial bus ride. Each component of this option will make transit information more readily available to potential transit users as well as existing users. While implementing all facets of this option would be preferable, taking on only some ideas, or implementing ideas one by one over time might be acceptable.

Service information dissemination avenues proposed in this option include low and high tech features and are placed in order of priority based on estimated ratios of cost to effectiveness and logical progression in terms of implementation difficulty. The low-tech aspect of this option involves simply installing schedule-tubes on sign poles at all major bus stops. High-tech aspects include trip-planning software on the transit authority website, a text-message based 'next-bus' service, a smartphone/iPhone App or mobile internet site and a Facebook application. Each feature proposed in this option makes getting transit information easier, more convenient, and makes travel by transit more attractive. For example, a web-based trip-planner was developed by Trapeze Software Inc for TransLink in 2003 (Emmerson, 2003) on which users can enter an origin and destination with desired departure or arrival times. The system produces multiple travel options, making unfamiliar trips by transit less difficult. A text message-based "Next Bus" service was also implemented in the Vancouver region by TransLink in December, 2007. Using the Next Bus service, bus riders send a text message by mobile phone to TransLink with the five

digit bus-stop code posted at their stop and a computer server replies within seconds to provide scheduled arrival times of the next six buses (Luba, 2007).

*Figure 5.3: TransLink App on iPhone*
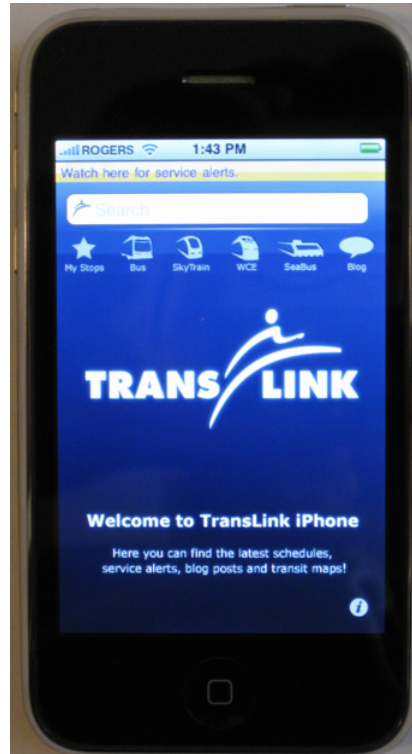
TransLink has also developed its own communications avenues optimised for smartphones (e.g. iPhone and Blackberry.) The iPhone App pictured in Figure 5.3 and the similar TransLink mobile internet site provide convenient, on-the-go information for transit users in the Vancouver region; features include interactive transit maps, schedules, bus stop information and integration into Google Maps with location-awareness for GPS-enable devices (Pabillano, 2008). TransLink has also developed its own Facebook application, which provides bus schedule information much like the text message-based Next Bus service. Like the iPhone App and mobile internet site, the TransLink Facebook application also allows Facebook users to store their favourite stop location and transit route number combinations for easy access without having to

remember the unique five-digit bus stop code (TransLink News Release, 2008).[34] Again, the components in this option make getting information about transit in Kelowna easier and more convenient for existing bus riders and more importantly, will attract potential choice transit users.

## 5.5    Option 5: Increased Advertising

Under this policy option, the Kelowna Regional Transit Authority develops a marketing campaign to raise the profile of transit, distribute information and influence attitudes and values to improve the image of transit in Kelowna and overall ridership. The intent of this campaign would be to influence behaviour, particularly of non-users of transit, in favour of greater and more frequent transit use. This campaign would involve both traditional advertising avenues as well as information distribution targeted at key market segments.

One aspect of this campaign would involve traditional advertising (print, radio, billboard or television) to combat negative stigma attached to public transit use. Advertisements would be developed to improve the image of transit as part of an effort to combat stigma that is associated with bus riding. Following survey findings indicating that social implications associated with riding the bus play a significant role in transportation mode choices, combating embarrassment about transit use would help raise transit ridership noticeably. For example, showing a well-regarded Kelowna personality (such as the mayor or members of the Kelowna Rockets hockey team) waiting at a bus stop and/or riding the bus in advertisements would help to reduce the stigma that some people in Kelowna place on bus riding.

This option also has Kelowna Regional Transit create and distribute an informational pamphlet directed at Kelowna retirees, which espouses particular features and benefits of transit attractive to retired people. The pamphlet could be distributed in local newspapers or by post with official municipal communications as part of an effort to attract retirees to the transit system. This

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[34] TransLink's iPhone App, mobile internet site and Facebook page were developed by Handi Mobility, a Vancouver software firm (Pabillano, 2008).

pamphlet would consist of a single sheet of double-sided paper, folded twice and in colour and would summarise all of the aspects of the Kelowna Regional Transit System that might appeal to retirees. Subjects would include financial savings from leaving the car at home, transit pass tax credits, presence of amicable security personnel at the Queensway Transit Mall who ensure safety and the many accessibility features of the modern bus fleet. The retiree pamphlet would also provide an opportunity to increase awareness about discounted fares for seniors and the Government of BC Bus Pass Program.[35]

Kelowna has a substantial and growing population of retirees and further tapping this large market segment could substantially increase transit ridership. Kelowna is well-known as one of the primary destinations in Canada for retired people to move to; indeed, Kelowna has been referred to as "Retirementville, Canada" in recognition of its popularity among retirees (Hanley, 2008). While statistics measuring per cent of the population in Canadian jurisdictions that is retired are unavailable, the age of 65 (common age of retirement) can be used as a proxy. Table 5.2 displays population statistics that show that on a per capita basis Kelowna has a very high number of people 65 years of age or older relative to most other jurisdictions. With 19 per cent of Kelowna over the age of 65, increasing transit ridership among this population segment would certainly have a substantial affect on overall transit ridership statistics for Kelowna.

*Table 5.2: Population, age 65 and above as a per cent of total population*

| Population[36] | Canada | British Columbia | Vancouver, BC (CMA) | Victoria, BC (CMA) | Kamloops, BC (CA) | Kelowna, BC (CMA) |
|---|---|---|---|---|---|---|
| Age 65 and above | 1,574,390 | 523,755 | 271,460 | 58,840 | 13,705 | 30,840 |
| Total | 31,612,895 | 4,113,485 | 2,116,580 | 330,090 | 92,880 | 162,275 |
| Per cent | 5.0% | 13% | 13% | 18% | 15% | **19%** |

Source: Statistics Canada 2006 Community Profiles (Statistics Canada, 2007).

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[35] An annual bus pass that allows unlimited travel to seniors receiving income assistance under BC Benefits.

[36] Refers to the age at last birthday (as of the census reference date, May 16, 2006). Figures derived from date of birth.

## 5.6    Summary

This study forwards four policy options for increasing transit ridership in Kelowna including express buses, increased service, service information dissemination and increased advertising. The intended effect of each policy option is to increase transit ridership in Kelowna through encouragement of transit use (as opposed to constraining use of other transportation modes) and by making bus riding in Kelowna more attractive. The next chapter uses previously discussed criteria to evaluate these policy options in order to make reasoned policy recommendations.

# 6: Policy Option Assessment

The following subsections assess the five policy options considered for increasing ridership on the Kelowna Regional Transit System using the criteria and measures established in section four. Options are first presented in a matrix to allow for easy comparison of the relative merits and drawbacks of each policy option. Option evaluations include survey data, consultation with key informants and experiences in other jurisdictions. Table 6.1 presents a detailed assessment of policy options and comparative ranking scores for each option across criteria, five being the highest available ranking under each criterion. The status quo serves as the base case.

*Table 6.1: Policy option assessment*

| Option | Annual Extra Cost (millions) | Effectiveness | Admin. Ease[37] | Public Acceptability | *Total (/20)* |
|---|---|---|---|---|---|
| Status Quo | None | No increase | (2+2+5)/3 | (1+1+2)/3 | |
| *Score* | *5* | *1* | *3* | *1* | *10* |
| Express Buses | $>6.0 | Increased Speed | (5+4+5)/3 | (5+5+5)/3 | |
| *Score* | *1* | *3* | *5* | *5* | *14* |
| Increased Service | $4.4 | Increased Connections | (5+3+3)/3 | (4+4+5)/3 | |
| *Score* | *2* | *2* | *4* | *4* | *12* |
| Service Info. Dissemination | $.250 - $2.0 | Increased Knowledge | (4+3+3)/3 | (5+4+5)/3 | |
| *Score* | *3* | *5* | *3* | *5* | ***16*** |
| Increased Advertising | $<0.250 | Reduced Shame, Increased Retired Users | (4+4+3)/3 | (3+3+2)/3 | |
| *Score* | *4* | *4* | *4* | *3* | ***15*** |

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[37] Administrative ease and public acceptability scores are provided by key informants noted in Section 4.3 and are averaged and rounded to produce a single score for each policy option.

## 6.1    Status Quo (Score: 10/20)

As Table 5.3 displays, the Status Quo is an unattractive option in most criteria categories, save for cost. As no *incremental* cost is involved in maintaining current policies and programs, the status quo has the highest rank for this criterion. In terms of effectiveness, the status quo is the least preferred option, as under the status quo there is no reason to expect a significant increase in transit ridership. The IBI Group (2005, 37) notes that as population increases each year, absolute transit system ridership in Kelowna also needs to increase simply to maintain a constant level. While transit officials in Kelowna may make commendable gains in overall ridership each year, in order to considerably improve per capita transit ridership new policies and practices are required.

In order to evaluate policy options based on administrative ease and public acceptability relevant key informants were contacted for their input. In terms of the administrative ease criterion Tania Wegwitz, Anita Wasiuta and Jerry Dombowsky and Mike Kittmer provide respective rankings for the status quo of 2, 2 and 5, resulting in an average (rounded) score of 3 out of five. It is somewhat surprising that the status quo did not receive a more preferable ranking in terms of administrative ease, as this option would have no new policies or programs be implemented by local transit administrators. Mike Docherty of Farwest Transit Services, Inc notes however that policies and practices are always under review and amended to meet the needs of customer demand and service requirement (Mike Docherty, Consultation, 3/03/09). Indeed, simply maintaining per capita transit ridership levels in a growing community such as Kelowna requires ongoing work on the part of transit administrators to keep pace with growing need.

Regarding public acceptability, the status quo is ranked poorly. Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 1, 1 and 2, resulting in an average (rounded) score of 1 out of five. This unfavourable ranking indicates consulted key informants estimate Kelowna residents would be largely unsatisfied were current programs and transit

services in Kelowna maintained without improvements or further efforts to increase transit ridership. Indeed, Wegwitz notes that there is an ongoing appetite for more transit (Tania Wegwitz, Interview, 3/04/09).

As mentioned, preserving the status quo is a justifiable option for the Kelowna Regional Transit Authority in that a working business model exists. Although the status quo scores well in terms of cost, scrutiny using other criteria (particularly effectiveness) suggests maintaining the status quo is not advisable. Overall the status quo scores poorly, with a total tally of 10 out of twenty.

## 6.2    Express Buses (Score: 14/20)

The express buses option receives a generally favourable score and ranks well relative to other policy options considered in terms of effectiveness, administrative ease and public acceptability; overall it receives a final score of 14 out of twenty. In terms of cost however this option scores as the least favourable of all those considered. Although the provincial government has pledged funds for Bus Rapid Transit in Kelowna (Skelton, 2008) funding is also required at the local level to implement this option (Sorensen, 2008). Indeed, the City of Kelowna is expecting to post tenders in spring 2009 for British Columbia's third RapidBus BC system; it is a $30 million five-year plan with capital expenditures on buses expected to cost $8 million to $9 million, while the remainder of the planned $30 million budget will go towards construction (Sorensen, 2008). These figures indicate average annual incremental spending of $6,000,000 on capital costs over the next five years; with the further addition of *substantially* increased operating costs, express buses ranks as the most expensive policy option considered and therefore receives an unfavourable ranking of 1 out of five.

Regarding effectiveness, express buses scores as the third most preferred policy option considered. This option can be evaluated using regression analysis findings from the survey of

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Kelowna residents. For express buses the relevant independent variable is Speed Relative to Car, as improving transit speeds to draw car users onto the bus is the primary objective of this policy option. Regression coefficient scores for Speed Relative to Car suggest those survey respondents who agree that taking the bus in Kelowna takes up too much time relative to travel by car are 4 times more likely to not ride the bus than those who disagree that Kelowna buses are too slow. In other words, slow buses results in lower ridership. Express buses are deemed to be more effective than the increased service option as it offers increased bus service but also brings rapid transit to Kelowna for the first time. Furthermore, introduction of BRT is shown to positively affect transit ridership. A 2003 report by the IBI Group reports that the 98-B Line express bus in Vancouver is highly effective at attracting new transit riders for its convenience and impressive travel times relative to conventional bus service (IBI Group, 2003). Indeed, the success of Bus Rapid Transit in Vancouver is just one of many positive examples.

Regarding the administrative ease criterion, Tania Wegwitz, Anita Wasiuta and Jerry Dombowsky and Mike Kittmer provide respective rankings of 5, 4 and 5, resulting in an average (rounded) score of 5 out of five. Dombowsky and Kittmer note that although a rapid bus system is not easy to implement, planning for the Kelowna routes is almost completely in place and the majority of the work is already done for Kelowna Regional Transit to go to BRT (Jerry Dombowsky and Mike Kittmer, Consultation, 3/04/09). Furthermore, the time horizon for implementing a tangible service improvement like express buses is normally quite long, however the option benefits in this case as much work has already been completed. Regarding public acceptability, Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 5, 5 and 5, resulting in a favourable average (rounded) score of 5 out of five. Wegwitz notes that the public is in favour of express buses as it signals to bus riders and non-users that local transit service is improving (Tania Wegwitz, Interview, 2/26/09).

## 6.3    Increased Service (Score: 12/20)

While increased service fares slightly better than the status quo, this option does not score particularly well overall, with a total of 12 out of twenty. The option generally receives mid-range rankings. One problem is that the price of implementing increased service is substantial, particularly in terms of operating costs. As noted, it is assumed that at present the Kelowna Regional Transit Authority acquires 2.4 new (40 foot) buses per year on average. This option proposes that Kelowna increase the rate of acquisition of new buses to 4 per year, or an incremental increase of 1.6 buses. The Central Okanagan Smart Transit Plan (IBI Group, 2005, 85) notes that the cost of one new, alternative fuel bus (40 foot) is $750,000. Therefore, the incremental cost in annual capital expenses of increasing the rate of bus acquisitions to 4 per year is $1,200,000[38] and the incremental annual operating cost for these new buses is $3,220,000; therefore the total incremental cost of the increased service policy option would be $4,420,000.[39] This places increased service as the second most expensive policy option considered and equates to a comparative cost ranking of 2 out of five.

Regarding the effectiveness criterion increased service is evaluated using the regression analysis findings from the survey of Kelowna residents; the relevant independent variable for increased service is Connections, as improving connections between transit vehicles is one of the

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[38] This figure is calculated by multiplying the cost of one new, alternative fuel 40 foot bus ($750,000) by the incremental increase (1.6) in the rate of annual new bus acquisitions by the Kelowna Regional Transit System.

[39] Operating costs of new buses: it is estimated that the per vehicle hour cost of operating a bus is approximately $100 (IBI Group, 2005, 33). This figure is composed of $20.28/hr in operator's wage, $59.32 in direct vehicle costs/hr (including $12.26/hr in vehicle maintenance) and $8.67 in indirect costs/vehicle hr (IBI Group, 2005, 33); the total of $88.27/vehicle hr is increased by 13.3% to an even estimate of $100/hr to account for cost increases (wages, price of fuel, et cetera) since information was tabulated (2004). Given the incremental increase of 1.6 in new bus acquisitions per year accounts for 2.3% of the total existing fleet of 70 buses, annual operating costs are also assumed to increase by 2.3%. Annual operating costs are computed by multiplying the estimated per vehicle hr operating cost ($100) by the projected 2009 conventional bus operating hours for Kelowna Regional Transit: 139,996 hrs (IBI Group, 2005, 82). Following the increase in rate of acquisition of new buses the Kelowna Transit Authority's new annual operating cost for buses is $17,219,508 (139,996*1.23)*$100]) or an incremental increase of $3,219,908 ($17,219,508-$13,999,600). Therefore the total incremental annual capital and operational costs for increased service are $4,419,908 ($1,200,000+$3,219,908).

primary objectives of this option. The regression coefficient score for Connections from Table 3.6 suggests that those survey respondents who disagree that connections between transit vehicles in Kelowna are good are 3 times more likely than those who agree with this statement to not ride the bus. In other words, poor perceptions of connections on Kelowna transit are a significant barrier to transit use. Relative to the other policy options considered, this option is ranked moderately in terms of effectiveness with a ranking of 2 out of five. This placement is superior to the status quo and is substantiated by research done previously in Kelowna indicating increasing the rate of acquisition of new buses and service hours in Kelowna brings substantial ridership gains. The IBI Group (2005, 35) notes that a 1996 policy change called for the rate of acquisition of new buses by the Kelowna Regional Transit Authority to be increased substantially. Following this change, statistics demonstrate that rapidly increasing the Kelowna bus fleet size and service hours resulted in substantial gains in ridership; furthermore, growth in ridership peaked in 2001, the same year hours of service peaked (IBI Group, 2005, 36). Although increased service is ranked higher than the status quo in terms of effectiveness, it is ranked lower than express buses as implementation of express buses effectively boosts provision of services while *also* offering a new, attractive type of service.

Regarding administrative ease, Tania Wegwitz, Anita Wasiuta and Jerry Dombowsky and Mike Kittmer provide respective rankings of 5, 3 and 3, resulting in an average (rounded) score of 4 out of five. Wegwitz notes that given necessary local partnerships are already in place and relevant parties know what their roles are, increasing service is not particularly challenging administratively. Still, the time horizon for an improvement like increased service may be extensive. In terms of public acceptability Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 4, 4 and 5, resulting in an average (rounded) score of 4 out of five. Wegwitz reports that the public would be largely accepting of increased service as expanded

service tends to be among the most frequent requests from passengers (Tania Wegwitz, Interview, 3/04/09).

## 6.4    Service Information Dissemination (Score: 16/20)

This option received the most preferred rating among the five policy options considered with an overall score of 16 out of twenty. Service information dissemination scores particularly well in terms of effectiveness and public acceptability. Regarding the cost criterion, an approximate range is provided as only estimates are available and cost of implementing this option would vary depending on the number of service information dissemination tools implemented; still the estimated range provided of $250,000 - $2,000,000 firmly places this option as one of the less expensive policy options considered and this results in a ranking of three out of five.[40]

For this policy option the cost and effectiveness criteria are closely linked, as it is reported that service information dissemination avenues are cost-effective undertakings in terms of increasing ridership. Tania Wegwitz notes having route schedules placed in a tube on bus stop poles is a simple and cost-effective way to communicate schedule information to bus riders while also communicating information about the transit system to other passers by who may be non-users (Tania Wegwitz, Interview, 2/26/09).[41] Also, regarding TransLink's text message-based Next Bus service, spokesman Drew Snider says it was "rather inexpensive" to develop (Luba, 2007) particularly given the usage statistics since implementation.

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[40] Regrettably, the author was unable to locate any concrete cost figures for any of the service information dissemination tools discussed for this policy option. The author contacted relevant parties at TransLink to request cost information but was unable to secure any specific figures. As such a *generous* cost estimate of $250,000-$2,000,000 is provided in order to avoid underestimation of costs and to reflect the discretion afforded by this policy option to the Kelowna Regional Transit Authority to implement service information dissemination tools of choice.

[41] The IBI Group (2005, 27) notes that there are approximately 575 bus stops in Kelowna therefore installing schedule-tubes at major bus stops (at the discretion of Kelowna Regional Transit) could equate to approximately 200 units.

In terms of effectiveness, service information dissemination scores as the most preferred policy option considered. This option can be evaluated using the regression analysis findings from the survey of Kelowna residents. For this option the relevant independent variable is Transit System Knowledge, as improving access to transit system information is the primary objective of this policy option. The regression coefficient score for Transit System Knowledge from Table 3.6 suggests that those survey respondents who report unfamiliarity with transit in Kelowna are 15 times more likely to not ride the bus than those who report being familiar with it. In other words, unfamiliarity with the bus system results in lower ridership.

Ranking service information dissemination as the most effective policy option in terms of its ability to increase transit ridership is corroborated by academic research and experiences in other jurisdictions. In his book, *Effective Use of Transit Websites*, Bruce Shaller (2002) notes that transit websites appeal to a wide audience, including nonriders, and that providing trip-planning information can expand a transit agency's ridership base. Also, general dissemination of maps and schedules makes transit easier to use and thus can lead to increased ridership among both regular and occasional transit users as well as non-riders (Shaller, 2002). Having well designed and interactive transit websites also conveys an up-to-date image and therefore could reduce negative associations toward transit (Shaller, 2002).

Indeed, the services discussed here have been implemented in Vancouver by TransLink (trip-planning website, Next Bus service, et cetera) and are very successful as users access them frequently. Upon implementation of the Trapeze trip-planning software on the TransLink website, Wayne Dale of Coast Mountain Bus Company notes that website traffic increased significantly and was expected to continue to increase as, "these web services provide convenient, 24/7 access to transit information and promote wider use of transit by the public" (Emmerson, 2003). Indeed, TransLink's trip-planner continues to do robust business today (Pabillano, 2008). As of November, 2008 the Next Bus service operated by TransLink handled over 3 million requests;

this is an impressive level of consumer engagement since its inception in December 2007 (Pabillano, 2008). TransLink notes that high-tech transit information has been particularly popular among transit users under 30 years of age (Pabillano, 2008). With this in mind, one possible critique of this option is that Kelowna residents will not take up technology-based transit information as readily as Vancouverites given the population statistics presented which show a high proportion of Kelowna residents are over age 65. However, key informants report that web-based trip-planning software remains one of the most requested transit service improvements.

Regarding the administrative ease criterion Tania Wegwitz, Anita Wasiuta and Jerry Dombowsky and Mike Kittmer provide respective rankings of 4, 3 and 3, resulting in an average (rounded) score of 3 out of five. Wasiuta notes that the process to capture the required funding is in progress although purchases, installation and delivery require a longer time horizon (Anita Wasiuta, Consultation, 3/03/09). In terms of public acceptability Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 5, 4 and 5, resulting in a very favourable average (rounded) score of 5 out of five. Wegwitz notes that public acceptability of service information dissemination is high as it provides the "best bang for your buck" and that the most frequent request from transit users is for a web-based trip-planner (Tania Wegwitz, Interview, 2/26/09). Wasiuta echoes these sentiments, noting that trip-planning software is the most frequently requested upgrade for BC Transit (Anita Wasiuta, Consultation, 3/03/09).

## 6.5    Increased Advertising (Score: 15/20)

Increased advertising scores well and ranks as the second most preferred policy option among those considered with a total score of 15 out of twenty. Increased advertising ranks comparatively well in terms of cost and effectiveness, although it suffers somewhat in terms of public acceptability. Regarding the cost criterion, as with the service information dissemination option, an approximate range is provided because the cost of implementing this option would vary depending on the advertising medium chosen, the number of times the message is conveyed

and the distribution of the retiree's pamphlet. Still, the estimated range provided of less than $250,000[42] places this option as the second least expensive policy option considered after the status quo and results in a favourable ranking of 4 out of five.

Considering effectiveness, increased advertising scores as the second most preferred policy option considered. Descriptive statistics of survey results suggest that current marketing practices by the Kelowna Regional Transit Authority are insufficient, given that 71 per cent of respondents indicate being unaware of free transit in Kelowna on annual Clean Air Day and 88 per cent of those surveyed indicate being unaware of the ProPASS program; this is particularly problematic given that the survey sample is comprised of a majority of transit users. This option can also be evaluated using regression analysis findings from the survey of Kelowna residents. For increased advertising there are two relevant independent variables: Shame and Retired. These variables are relevant as this campaign is aimed at both negative stigma associated with bus riding and retirees. By targeting all Kelowna residents with the traditional advertising promoting a positive image of transit (combating shame associated with bus riding) this option communicates to all potential transit users. Additionally, by also targeting retirees with the informational pamphlet, special attention is paid to market transit towards the one demographic group or trait identified to be significant with respect to transit use through regression analysis.

The regression coefficient score for Shame suggests that those survey respondents who agree that they would not want to be seen waiting at a bus stop in Kelowna are 5 times more likely to not ride the bus than those who disagree that they would be ashamed to be seen waiting

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[42] An annual increased advertising budget of up to $250,000 would provide ample funding for both the retirees pamphlet and the traditional advertising to combat negative stigma. Given the Kelowna CMA has approximately 30,000 people 65 years of age (proxy for retirement age) or older (Statistics Canada, 2007), roughly 20,000 retirees pamphlets would be required. A reasonable printing/distribution budget of $1 per unit would leave up to $230,000 available for traditional advertising. If Kelowna Regional Transit elected to combat negative stigma associated with bus riding through radio and print advertisements, $230,000 per year would allow for frequent public communications. Regarding radio ads, a 30 second commercial could be run 5 times per day on a popular radio station such as CILK 101.5 FM at an approximate annual cost of $110,000, while the radio spot could be produced for approximately $5000. The remaining $115,000 of the annual increased advertising budget would provide ample funds for weekly print advertisements in the well-circulated Kelowna Daily Courier newspaper.

at a bus stop. In other words, negative stigma results in lower ridership. The regression coefficient score for the Retired variable from Table 3.6 suggests that those survey respondents who are retired are 5 times more likely to not ride the bus than those who are not retired. Jerry Dombowsky and Mike Kittmer are decidedly skeptical about the validity of an advertising campaign, noting that advertising alone is highly unlikely to change driving habits and result in increased transit ridership (Jerry Dombowsky and Mike Kittmer, Consultation, 3/04/09). To this the author would respond that this study provides new information on negative stigma attached to bus riding in Kelowna and therefore sheds light on an important problem. Indeed, out of a possible 37 variables, Shame was among 5 variables found to play a statistically significant role with respect to transit use and a well-designed marketing campaign could reverse this unfortunate finding.

Regarding administrative ease, Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 4, 4 and 3, resulting in an average (rounded) score of 4 out of five. Indeed, the time horizon needed for implementing increased advertising is relatively narrow relative to other more tangible service improvements. In terms of public acceptability Wegwitz, Wasiuta and Dombowsky and Kittmer provide respective rankings of 3, 3 and 2, resulting in an average (rounded) score of 3 out of five. Dombowsky and Kittmer claim that the public would not favour increased advertising given their own feeling on its low potential to be effective (Jerry Dombowsky and Mike Kittmer, Consultation, 3/04/09).

## 6.6    Summary

This chapter presents evaluations of the policy options considered for increasing transit ridership in Kelowna. The status quo is shown to be an unattractive option given unfavourable scores in most criteria categories, save for cost. Express buses is shown to be the third most preferred option as it ranks well relative to other options in terms of effectiveness, administrative ease and public acceptability. Increased service fares better than the status quo given mid-range

rankings in all categories save for public acceptability, which is high. Increased advertising is the next most preferred option which ranks comparatively well in terms of cost and effectiveness. Finally, service information dissemination is the most preferred option among the options considered; it scores particularly well in terms of cost, effectiveness and public acceptability. The following chapter provides final conclusions, including policy option recommendations based on the evaluation conducted in Chapter 6 and comments on study limitations.

# 7: Conclusions

Based on the evaluation of policy options discussed in the preceding chapters, the Kelowna Regional Transit Authority should consider implementing two policy options for increasing transit ridership. Specifically, priority should be immediately placed on implementing service information dissemination tools. Future consideration should also be given to implementing increased advertising.

In terms of other policy options considered, express buses ranks fairly well overall relative to other policy options considered, placing it as the third most preferred option overall. While the author might otherwise recommend against implementing a policy option were it not the highest or second highest-ranked option considered, consultation with key informants suggests that much work has already gone into BRT in Kelowna with significant sunk costs. As such this study does not recommend against implementing express buses in Kelowna.[43]

One important consideration to make amidst proposals for increased spending is of where funding comes from. As mentioned, funding for the Kelowna Regional Transit System is provided through a cost sharing arrangement between the City of Kelowna, the Regional District of Central Okanagan, the District of Lake Country and BC Transit. Regrettably, further details about the nature of this cost sharing arrangement are unavailable. Given the provincial government has established the ambitious goal of doubling transit ridership in British Columbia by 2020 (Ministry of Transportation, 2008, 17), additional funds may be available for increasing ridership in a sizable city like Kelowna, where transit ridership levels are conspicuously low.

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[43] Analysis also decidedly indicates Kelowna Regional Transit should not implement fare-free bus service in Kelowna. This option would not have a substantial affect on transit ridership, is costly and is the only policy option considered that scores less favourably than the status quo.

## 7.1 Priority: Service Information Dissemination

The first recommendation is that Kelowna Regional Transit take on service information dissemination as a top priority. Importantly, providing new information avenues is shown to be effective and this option is also highly acceptable to the public, as requests are frequently made to BC Transit for web-based trip-planning software. Although this option comes with high costs compared to other options considered (particularly if all noted information tools are pursued) the trade-off here is reasonable. Furthermore, there is potential to reduce costs considerably relative to those incurred in similar ventures by other transit authorities such as TransLink. For example, one of the key facets of this policy option is the recommendation that Kelowna Regional Transit implement a trip-planning feature on the transit authority's website; significant cost savings could be realised on implementation of trip-planning software for Kelowna through Google Transit.

Many transit agencies (70 agencies in 10 countries, including TransLink) have linked their websites to the Google Transit website, where transit stop, route, schedule and fare information are integrated to make trip-planning quick and easy (Google Transit Partner Program, website). By linking to the popular Google webpage transit agencies benefit by raising awareness of public transportation to attract new choice (as opposed to captive) riders (Google Transit Partner Program, website). Most importantly, the service is offered completely free of charge so long as the transit agency is willing to share its data regarding routes and stop locations (Google Transit Partner Program, website). One notable success story tells of how Hampton Roads Transit, a public transportation provider in seven Virginia cities, was able to integrate its schedule information with Google Transit and skip the step of setting up its own online trip-planning feature (Google Transit Partner Program, website). Such a move by Kelowna Regional Transit would realise significant cost savings relative to the contracted service provided to TransLink by Trapeze in 2003.

## 7.2    Future Consideration: Increased Advertising

This study also recommends the Kelowna Regional Transit Authority employ increased advertising in the future to combat negative stigma about bus riding and attract retirees to transit. Logistic regression indicates being retired and shame associated with bus riding are barriers to transit use. By spreading positive information about the bus system in Kelowna, ridership will be increased relative to the status quo. Increased advertising is the second most preferred option considered in evaluation, with strong rankings in terms of cost and effectiveness.

Further investigation of survey findings using crosstabulation tests informs the direction and tone of both advertising directed at retirees (pamphlet) and advertising aimed at reducing negative stigma. Regarding retirees, of the 49 retired individuals surveyed, 33 (67 per cent) report never taking the bus, as compared to 16 bus riders. Retirees view many of the service provisions from Kelowna Regional Transit positively: 94 per cent feel buses are clean, 75 per cent agree buses are reliable and on time, and 65 per cent feel waiting at bus stops is safe. Less encouragingly, a majority 51 per cent feel buses do not run frequently enough and 80 per cent feel that buses in Kelowna are too slow compared to travelling by car. This suggests that following implementation of service improvements, such as express buses, would be an ideal time to contact retirees in Kelowna to communicate the merits of bus riding. Most notably, a majority of retirees contacted disagree with three of four statements affirming negative stigma attached to bus riding and 60 per cent indicate being unaware of transit system schedules, routes and fare prices. These findings further validate the proposal for a retirees pamphlet and that the pamphlet be designed in a manner distinct from the general anti-stigma advertising campaign.

Regarding the anti-stigma marketing campaign proposed in this option, crosstabs performed with the Shame variable also inform the direction of this promotion. Of the 60 survey respondents who agreed that they would not want to be seen waiting at a bus stop in Kelowna, 70 per cent are not students, 97 per cent are employed, 62 per cent are female and 35 per cent are

aged 18-24. These findings suggest that advertising aimed at reducing the negative stigma attached to bus riding in Kelowna would be most effective if designed with young, employed women in mind as a key target audience.

Increased advertising is recommended for future consideration given that the service information dissemination option is rated more favourably, but also for deliberate reasons. Litman (2008c) finds that although there are limits to what marketing can do to influence travel behaviour, marketing programs with adequate resources can significantly increase use of public transit and reduce automobile travel. He cautions however that marketing can be counterproductive if transit service may be viewed as inadequate: if advertising successfully encourages car drivers to try transit but service is not convenient and pleasant to use, travelers may have a poor experience which will solidify their belief in the validity of taking the car over public transportation (Litman, 2008c). Following this instruction, it is recommended that Kelowna Regional Transit wait for improvements to the local transit system (such as forthcoming implementation of Bus Rapid Transit) before taking on increased advertising.

As with most policy changes, implementation of recommended policy options involves more than simply approving a new direction or program. As observed by all consulted key informants, one of the primary administrative challenges in adopting policy alternatives is securing sufficient funding for a given policy option to be viable (Anita Wasiuta, Consultation, 3/03/09; Jerry Dombowsky and Mike Kittmer, Consultation, 3/04/09; Tania Wegwitz, Interview, 3/04/09). Furthermore, prior to implementation transit administrators need to conduct research to determine and/or confirm best practices for successful execution and operation.

## 7.3   Summary

The general message of this study is that transit in Kelowna, often viewed primarily from an engineering standpoint, may be considered too narrowly. Although local residents indicate in

survey questionnaires that they are interested in using public transportation more (Kettle Valley Research, 2008, 31), ridership levels are disappointingly low. While tangible transit service improvements (such as implementation of Bus Rapid Transit) will attract new bus riders, other types of transit improvements regarding intangibles may prove to be more cost-effective. As Gilbert and Foerster (1977, 322) note, transit ridership can be increased through improvements to "soft" or "non-engineering" transit system characteristics such as information availability, appearance and advertising. Indeed, key informants interviewed note that rather than more buses or new bus routes, the most frequent service improvement request is actually for a "soft" development: a trip-planning tool on the transit authority website (Tania Wegwitz, Interview, 2/26/09, Anita Wasiuta, Consultation, 3/03/09). Furthermore, my own survey work shows that negative stigma exists toward bus riding in Kelowna, and further, that these types of social concerns play a significant role in transportation mode choices. Advertising directed at combating unnecessary shame toward public transportation use in Kelowna may also prove to be a cost-effective means of increasing ridership. Service improvements that take into account these types of "soft" or "non-engineering" issues should also be considered with conventional service improvements in attempts to solve the problem of low transit ridership in Kelowna. Indeed, besides lower costs, the time horizon on "non-engineering" improvements is much shorter than for projects like implementing express buses.

Despite noted limitations, the lack of previous research on transportation mode choices in Kelowna that takes social implications of these mode choices into account lends validity to this study. Furthermore, the finding that negative stigma attached to bus riding serves as a statistically significant barrier to transit use in Kelowna is a valuable discovery. It suggests approaches to future transit marketing campaigns in Kelowna and perhaps elsewhere. Much like the public service announcements that attempt to break down the negative stigma sometimes attached to visual impairment or those with mental health issues, social marketing campaigns aimed at

changing the perception that public transportation is something designated for the poor will have an important role to play in the future. Discovering new approaches to effectively marketing public transportation systems seems particularly relevant as concern over climate change grows and urban commuters grow increasingly frustrated with paralysing traffic congestion.

In conclusion, survey data indicate that there are multiple factors that influence transit use among survey respondents in Kelowna in a statistically significant way. The recommended options are intended to improve public transit ridership by way of improving "soft" or "non-engineering" transit system characteristics such as information availability, appearance and advertising, as suggested by Gilbert and Foerster (1977, 322). The recommended policy option of priority (implementing service information dissemination tools) aims to counteract the finding that those survey respondents who are unfamiliar with transit in Kelowna are 15 times more likely to not ride transit than those who are familiar with it. Admittedly, this figure is influenced by the logical notion that as one uses transit more he or she becomes more familiar with the system. But what this recommendation aims to do is build transit ridership in Kelowna by making it easier and more convenient to become familiar with transit in advance of one's initial bus ride. Findings from other jurisdictions demonstrate that improved marketing, schedule availability and overall convenience lead to growth in choice transit riders.

In the future, once other transit improvements such as forthcoming Bus Rapid Transit are implemented, it is also recommended that the Kelowna Regional Transit Authority engage in increased advertising. Marketing directed at attracting retirees will help the system tap further into a substantial and growing market segment in Kelowna that is shown to be reserved about taking transit. Messages that combat negative stigma attached to bus riding will work towards removing a significant barrier to transit use that unjustly deprecates a valuable public service and its users to the effective detriment of all commuters.

**Appendices**

# Appendix A: Survey Instrument

## GETTING AROUND IN KELOWNA

**SIMON FRASER UNIVERSITY**

This survey is being conducted for the purposes of gathering information about transportation habits and perceptions in Kelowna for public information and academic study by Adam Schubel, Masters Candidate in the Public Policy Program at Simon Fraser University. Completion of this survey constitutes your consent to participate in this study. Survey results will be available through the SFU Library and the MPP Program. For concerns or complaints, please contact Dr. Hal Weinberg, SFU Office of Research Ethics (778-782-6593). _The study team will not be aware of your name or identity and will never release data that would be attributable to you._

1.  What is your *main* mode of transportation in Kelowna? *(Please <u>check only one</u>)*

    ₁☐ Car      ₂☐ Bus      ₃☐ Walk      ₄☐ Cycle      ₅☐ Carpool/shared car      ₆☐ Other: _____

2.  How many *one-way trips* did you make in Kelowna *last week* <u>by any mode of transportation</u>?

    #_____ *total* trips last week      (going somewhere and coming home is 2 one-way trips)

3.  How many *one-way trips* did you make in Kelowna *last week* <u>by bus</u>?

    #_____ *bus* trips last week      (going somewhere and coming home is 2 one-way trips)

4.  How would your describe your use of the <u>bus</u> in Kelowna?

    ₁☐ I never take the bus              ₃☐ I use it a lot, but not for every trip
    ₂☐ I only use it sometimes        ₄☐ It's my main way of getting around town

The following questions are about *your* **<u>perceptions</u>** of the bus service in Kelowna: <u>(it's OK to answer even if you never take the bus)</u>

|     |                                                                                      | Strongly Agree | Somewhat Agree | Somewhat Disagree | Strongly Disagree |
| --- | ------------------------------------------------------------------------------------ | :---: | :---: | :---: | :---: |
| 5.  | Buses in Kelowna tend to be clean.                                                    | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 6.  | Getting information about bus service in Kelowna is easy and convenient.              | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 7.  | Buses in Kelowna tend to be reliable and on time.                                    | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 8.  | Buses in Kelowna run frequently enough for me.                                       | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 9.  | The bus system in Kelowna has good connections with reasonable waiting times at transfer points. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 10. | Waiting at bus stops in Kelowna is safe.                                              | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 11. | Riding the bus in Kelowna is safe.                                                   | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 12. | Bus routes in Kelowna are direct and have the appropriate number of stops.           | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 13. | Traveling by bus in Kelowna means you'll get to your destination on time.            | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 14. | Taking the bus in Kelowna is too expensive.                                          | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 15. | Taking the bus in Kelowna takes up too much time compared to driving.                | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 16. | Taking the bus in Kelowna means I won't get a seat and I will have to stand while the bus is moving. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 17. | There is no privacy and too little personal space on buses in Kelowna.               | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 18. | It's too hard to transport groceries or other purchases and goods on the bus.        | ₁☐ | ₂☐ | ₃☐ | ₄☐ |

*PLEASE TURN THE QUESTIONNAIRE OVER -> -> -> -> ->-> -> ->-> -> ->*

|  | | Strongly Agree | Somewhat Agree | Somewhat Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| 19. | People on the bus in Kelowna are intoxicated, smell bad, or are otherwise unappealing to me. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 20. | I wouldn't want to be seen waiting at a bus stop in Kelowna. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 21. | People in Kelowna look down on bus riders. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |
| 22. | People in Kelowna think driving is cooler than taking the bus. | ₁☐ | ₂☐ | ₃☐ | ₄☐ |

23. Would you say that you live within reasonable walking distance from a bus stop?

₁☐ Yes          ₂☐ No

24. How far do you live from a bus stop? (in *walking* minutes)

₁☐ Less than 5 minutes   ₂☐ 5 – 10 minutes   ₃☐ 10 – 15 minutes   ₄☐ More than 15 minutes   *OR*   ₅☐ Don't know

25. Thinking about your *primary destination* in Kelowna (eg: work, school), would you say it is within reasonable distance from a bus stop?

₁☐ Yes          ₂☐ No

26. Thinking about your *primary destination* in Kelowna, how far is it from a bus stop? (in *walking* minutes)

₁☐ Less than 5 minutes   ₂☐ 5 – 10 minutes   ₃☐ 10 – 15 minutes   ₄☐ More than 15 minutes   *OR*   ₅☐ Don't know

27. How well do you know the bus system in Kelowna? (eg: routes, schedules, fare costs, etc.)  Are you:

₁☐ Not at all familiar      ₃☐ Somewhat familiar
₂☐ Not very familiar        ₄☐ Very familiar

28. Do you have access to a car?

₁☐ Yes          ₂☐ No

30. Please indicate if you are *aware* of any of the following programs offered by Kelowna Regional Transit:

29. Do you have a valid driver's license?

₁☐ Free transit on annual *Clean Air Day*s
₂☐ ProPass Program

₁☐ Yes          ₂☐ No

## ABOUT YOU

31. Do any of the following apply to you? (Please *check all that apply*)

₁☐ Student     ₂☐ U-Pass holder     ₃☐ ProPass holder     ₄☐ Unemployed     ₅☐ Retired     ₆☐ Disabled

32. Are you:

₁☐ Female
₂☐ Male

35. Are you responsible for a child <u>younger than 16</u> years of age?

₁☐ Yes
₂☐ No

33. Your Postal Code:

_____ - _____

36. What is your annual *household* income?

34. Your Age:

| | |
|---|---|
| ₁☐ 18-24 | ₄☐ 45-54 |
| ₂☐ 25-34 | ₅☐ 55-64 |
| ₃☐ 35-44 | ₆☐ 65+ |

₁☐ $0-19,999          ₅☐ $80,000-99,999
₂☐ $20,000-39,999     ₆☐ $100,000-119,999
₃☐ $40,000-59,999     ₇☐ $120,000-139,999
₄☐ $60,000-79,999     ₈☐ $140,000 or more

## Appendix B: Survey Administration

Chapter 3 discusses results of the Kelowna transit survey. To follow is a discussion of the process of administering that survey. In all, 334 survey questionnaires were administered to Kelowna residents over a three-week period from 15 December, 2008 to 5 January, 2009 (for survey instrument, see Appendix A). Intercept sampling was chosen as the preferred method for survey administration, given its cost-effective nature, ability to provide results quickly, and appropriateness in circumstances where the incidence of transit users in the general population is low (Shaller, 2005, 1), as is the case in Kelowna.

A significant minority among the total survey responses collected were obtained through extended personal-contact networks. Willing contacts obligingly took questionnaires to places of employment and other areas of congregation. Through this form of distribution survey results include personnel from major employers in Kelowna, such as the Interior Health Authority, Kelowna Flightcraft and School District 23. Through personal contact networks, survey responses were also elicited from small businesses and members of organisations such as the Rotary Club of Kelowna, Project Literacy Kelowna Society, New Opportunities for Women Canada Society and local recreation centres.

To broaden the demographic and travel pattern diversity of potential respondents, four separate public survey sites were chosen in the Kelowna area for extensive survey administration. The majority of the 334 survey responses were gathered at the four selected sites described briefly below:

- Capri Mall Shopping Centre (located at Harvey Avenue and Gordon Drive, Kelowna): This site near the geographic centre of Kelowna houses employers such as the local health authority and a chain grocery store. Together with other retailers the mall employs a wide variety of people and attracts a diverse group of patrons. Survey administration was conducted primarily in the mall's food court area. Patrons who congregate here tend

to be from a variety of different demographic groups including those who live in the area and others who commute in from elsewhere. Capri Mall is notably popular with senior citizens and retirees.

- University of British Columbia Okanagan (located at the north end of town, near Kelowna International Airport): This UBC campus is of medium size, with a student population of approximately 6000. The campus provides accommodation for approximately 1100 students, therefore the majority of students here are commuters. The school participates in a U-Pass program with the Kelowna Regional Transit Authority, so there is likely a mix of automobile drivers and transit users.

- Okanagan College: KLO Campus (located on KLO Road on the east side of Kelowna, towards the sector of the city known as Okanagan-Mission): Okanagan College has seven campuses across the Southern Interior region of BC and is the largest community college in BC outside of the Lower Mainland region. It serves as the main institution in Kelowna providing trades, technologies and vocational training. The KLO campus has limited residence spaces, therefore this location is largely a commuter campus.

- Queensway Transit Mall[44] (located in downtown Kelowna): The Queensway Transit Mall serves as the main bus loop in Kelowna and is a terminus stop for most routes operated by the Kelowna Regional Transit System and is one of the system's main nodes. Queensway is the central public transportation departure point for the entire Central Okanagan, and this bus loop services the largest of Kelowna's four town centres. The Queensway Transit Mall is located in close proximity to a wide variety of employers, shops and amenities, including Kelowna City Hall, parks and other cultural amenities. Also nearby is a federal government building offering Service Canada provisions, as well as a number of charitable organizations, such as the Union Gospel Mission.

In compliance with Simon Fraser University Department of Research Ethics policy, respondents were made aware of the survey purpose, the lack of mandatory participation and the

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[44] A disproportionate amount of time was spent at the Queensway Transit Mall as compared to other areas of Kelowna where survey work was done. Being as Queensway is the main node and one of the primary transfer points for the Kelowna bus system, it serves as one area where it is likely that survey respondents would be largely transit users. For purposes of statistical analysis, a strong contingent of transit riders is desirable; for this reason, numerous days of survey work were spent at the Queensway Transit Mall over the three-week period of survey collection.

lack of collection of personal information that might allow for attribution of responses to individuals. Questionnaires were presented to respondents on clipboards with the expectation that they would read and answer all questions without aid from the survey administrator. Those who preferred, whether due to a physical disability or otherwise, could choose to have the questions read aloud to them by the survey administrator. In total, six clipboards were present allowing for a total of six surveys to be administered simultaneously. Respondents took, on average, five minutes to complete questionnaires. Regarding survey work conducted outdoors (such as at the Queensway Transit Mall), weather conditions were unfavourable (unusually cold temperatures for December in Kelowna). Admittedly this may have affected the way in which survey respondents completed questionnaires as some individuals may have rushed through survey completion. This was not deemed to be a significant problem however, as most individuals took approximately 5 minutes to complete the questionnaire whether outdoors or indoors. Furthermore, although survey work was conducted in December, there were no significant service delays or disruptions due to inclement weather during the period of survey administration.

# Appendix C: Crosstabulation Tables

*Table 7.1: Crosstabs: Perceptions and Attitudes variables*

| Variable Name | Response[45] | Non-rider % | Non-rider Count | Rider % | Rider Count | Pearson Chi$^2$ | Sig. at .05 |
|---|---|---|---|---|---|---|---|
| Cleanliness | **Not clean** | 26.8 | 11 | 73.2 | 30 | .044 | *** |
|  | Clean | 43.3 | 127 | 56.7 | 166 |  |  |
| Information | **Not easy to get info** | 52.8 | 47 | 47.2 | 42 | .010 | *** |
|  | Easy to get info | 37.1 | 91 | 62.9 | 154 |  |  |
| Reliability | **Not reliable** | 36.7 | 51 | 63.3 | 88 | .147 |  |
|  | Reliable | 44.6 | 87 | 55.4 | 108 |  |  |
| Frequency | **Not frequent enough** | 47.5 | 94 | 52.5 | 104 | .006 | *** |
|  | Frequent enough | 32.4 | 44 | 67.6 | 92 |  |  |
| Connections | **Not good** | 51.6 | 96 | 48.4 | 90 | .000 | *** |
|  | Good | 28.4 | 42 | 71.6 | 106 |  |  |
| Safety at Stops | **Not safe at stops** | 51.9 | 69 | 48.1 | 64 | .001 | *** |
|  | Safe at stops | 34.3 | 69 | 65.7 | 69 |  |  |
| Safety on Buses | **Not safe on bus** | 70.6 | 36 | 29.4 | 15 | .000 | *** |
|  | Safe on bus | 36.0 | 102 | 64.0 | 181 |  |  |
| Routes | **Routes not direct** | 58.3 | 74 | 41.7 | 53 | .000 | *** |
|  | Routes direct | 30.9 | 64 | 69.1 | 143 |  |  |
| Punctuality | **Not on time by bus** | 44.6 | 79 | 55.4 | 98 | .191 |  |
|  | On time going by bus | 37.6 | 59 | 62.4 | 98 |  |  |
| Fare Price | **Bus too expensive** | 41.1 | 44 | 58.9 | 63 | .960 |  |
|  | Bus not too expensive | 41.4 | 94 | 58.6 | 133 |  |  |
| Speed Relative to Car | **Too slow versus car** | 48.7 | 127 | 51.3 | 134 | .000 | *** |
|  | Not too slow v. car | 15.1 | 11 | 84.9 | 62 |  |  |
| Standing | **Will have to stand** | 38.4 | 33 | 61.6 | 53 | .520 |  |
|  | Will not have to stand | 42.3 | 105 | 57.7 | 143 |  |  |
| Privacy | **Privacy an issue** | 39.3 | 46 | 60.7 | 71 | .586 |  |
|  | Privacy not an issue | 42.4 | 92 | 57.6 | 125 |  |  |
| Transporting Goods | **Too difficult** | 50.9 | 117 | 49.1 | 113 | .000 | *** |
|  | Not Too difficult | 20.2 | 21 | 79.8 | 83 |  |  |

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[45] Bold indicates category is hypothesised to correlate with non-transit ridership.

*Table 7.2: Crosstabs: Stigma Indicator variables*

| Variable Name | Response[46] | Non-rider % | Non-rider Count | Rider % | Rider Count | Pearson Chi$^2$ | Sig. at .05 |
|---|---|---|---|---|---|---|---|
| Unappealing Passengers | **Unappealing** | 36.1 | 52 | 63.9 | 92 | .093 | |
| | Not unappealing | 45.3 | 86 | 54.7 | 104 | | |
| Shame | **Ashamed of bus** | 53.3 | 32 | 46.7 | 28 | .037 | *** |
| | Not ashamed of bus | 38.7 | 106 | 61.3 | 168 | | |
| Condescension | **People look down** | 40.0 | 52 | 60.0 | 78 | .696 | |
| | Do not look down | 42.2 | 86 | 57.8 | 118 | | |
| Prestige | **Driving is cooler** | 41.2 | 93 | 58.8 | 133 | .929 | |
| | Driving not cooler | 41.7 | 45 | 58.3 | 63 | | |

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[46] Bold indicates category is hypothesised to correlate with non-transit ridership.

*Table 7.3: Crosstabs: Personal Conditions variables*

| Variable Name | Response[47] | Non-rider % | Non-rider Count | Rider % | Rider Count | Pearson Chi$^2$ | Sig. at .05 |
|---|---|---|---|---|---|---|---|
| Stop Distance Reasonability | **Do not live close to bus stop** | 66.2 | 43 | 33.8 | 22 | .000 | *** |
| | Live close to bus stop | 35.3 | 95 | 64.7 | 174 | | |
| Home Stop Distance | **Live more than 10 min. from stop** | 52.2 | 35 | 47.8 | 32 | .091 | |
| | Live 5-10 min. from stop | 38.8 | 33 | 61.2 | 52 | | |
| | Live less than 5 min. from stop | 37.1 | 66 | 62.9 | 112 | | |
| Destination Reasonability | **Destination not close to bus stop** | 63.1 | 41 | 36.9 | 24 | .000 | *** |
| | Destination close to bus stop | 36.1 | 97 | 63.9 | 172 | | |
| Destination Stop Distance | **Dest. more than 10 min. from stop** | 42.2 | 27 | 57.8 | 37 | .692 | |
| | Dest. 5-10 min. from stop | 35.9 | 33 | 64.1 | 59 | | |
| | Dest. less than 5 min. from stop | 40.3 | 64 | 59.7 | 95 | | |
| Transit System Knowledge | **Not very or not at all familiar** | 80.3 | 110 | 19.7 | 27 | .000 | *** |
| | Somewhat or very familiar | 14.2 | 28 | 85.8 | 169 | | |
| Car Access | **No car access** | 58.7 | 138 | 41.3 | 97 | .000 | *** |
| | Yes car access | 0.0 | 0 | 100.0 | 99 | | |
| Driver's Licence | **No valid driver's licence** | 52.5 | 134 | 47.5 | 121 | .000 | *** |
| | Yes valid driver's licence | 5.1 | 4 | 94.9 | 75 | | |
| Clean Air Day Awareness | **Not aware of Clean Air Day** | 45.8 | 109 | 54.2 | 129 | .009 | *** |
| | Aware of Clean Air Day | 30.2 | 29 | 69.8 | 67 | | |
| ProPASS Program Awareness | **Not aware of ProPASS Program** | 42.9 | 126 | 57.1 | 168 | .121 | |
| | Aware of ProPASS Program | 30.0 | 12 | 70.0 | 28 | | |

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[47] Bold indicates category is hypothesised to correlate with non-transit ridership.

*Table 7.4: Crosstabs: Demographics variables*

| Variable Name | Response[48] | Non-rider % | Non-rider Count | Rider % | Rider Count | Pearson Chi$^2$ | Sig. at .05 |
|---|---|---|---|---|---|---|---|
| Student | **Not student** | 49.2 | 124 | 50.8 | 128 | .000 | *** |
| | Student | 17.1 | 14 | 82.9 | 68 | | |
| U-Pass | **Not U-Pass holder** | 43.4 | 135 | 56.6 | 176 | .004 | *** |
| | U-Pass holder | 13.0 | 3 | 87.0 | 20 | | |
| ProPASS | **Not ProPASS holder** | 41.6 | 137 | 58.4 | 192 | .329[49] | |
| | ProPASS holder | 20.0 | 1 | 80.0 | 4 | | |
| Unemployed | **Not unemployed** | 44.1 | 137 | 55.9 | 174 | .000 | *** |
| | Unemployed | 4.3 | 1 | 95.7 | 22 | | |
| Retired | **Retired** | 67.3 | 33 | 32.7 | 16 | .000 | *** |
| | Not retired | 36.8 | 105 | 63.2 | 180 | | |
| Disabled | **Not disabled** | 42.8 | 134 | 57.2 | 179 | .032 | *** |
| | Disabled | 19.0 | 4 | 81.0 | 17 | | |
| Gender | **Male** | 39.0 | 60 | 61.0 | 94 | .419 | |
| | Female | 43.3 | 78 | 56.7 | 102 | | |
| Age | **45 and above** | 57.4 | 81 | 42.6 | 60 | .000 | *** |
| | 25-44 | 42.6 | 40 | 57.4 | 54 | | |
| | 18-24 | 17.2 | 17 | 82.8 | 82 | | |
| Young Children | **Yes** | 42.6 | 23 | 57.4 | 31 | .954 | |
| | No | 42.2 | 113 | 57.8 | 155 | | |
| Income | **$60,000 and above** | 64.4 | 67 | 35.6 | 37 | .000 | *** |
| | $20,000-59,999 | 33.9 | 38 | 66.1 | 74 | | |
| | $0-19,999 | 10.1 | 8 | 89.9 | 71 | | |

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[48] Bold indicates category is hypothesised to correlate with non-transit ridership.

[49] 2 cells have expected count less than 5, therefore the ProPASS variable cannot be used in regression models.

# Appendix D: Collinearity Statistics and Logistic Regression Tables

*Table 7.5: Collinearity statistics*

| Variable Name | Tolerance[50] | VIF[51] |
|---|---|---|
| Cleanliness | .754 | 1.326 |
| Information | .762 | 1.312 |
| Reliability | .543 | 1.842 |
| Frequency | .582 | 1.171 |
| Connections | .543 | 1.840 |
| Safety at Stops | .642 | 1.557 |
| Safety on Buses | .672 | 1.488 |
| Routes | .652 | 1.534 |
| Punctuality | .530 | 1.886 |
| Fare Price | .783 | 1.277 |
| Speed Relative to Car | .770 | 1.299 |
| Standing | .665 | 1.504 |
| Privacy | .664 | 1.505 |
| Transporting Goods | .689 | 1.452 |
| Unappealing Passengers | .715 | 1.398 |
| Shame | .729 | 1.372 |
| Condescension | .576 | 1.736 |
| Prestige | .669 | 1.496 |
| Stop Distance Reasonability | .431 | 2.322 |
| Home Stop Distance | .450 | 2.220 |
| Destination Reasonability | .575 | 1.738 |
| Destination Stop Distance | .598 | 1.673 |
| Transit System Knowledge | .644 | 1.553 |
| Car Access | .409 | 2.447 |
| Driver's Licence | .476 | 2.101 |
| Clean Air Day Awareness | .826 | 1.211 |
| ProPASS Program Awareness | .754 | 1.326 |
| Student | .464 | 2.156 |
| U-Pass | .781 | 1.280 |
| ProPASS | .761 | 1.315 |
| Unemployed | .790 | 1.265 |
| Retired | .695 | 1.439 |
| Disabled | .722 | 1.385 |
| Gender | .822 | 1.217 |
| Age | .400 | 2.500 |
| Young Children | .833 | 1.201 |
| Income | .543 | 1.842 |

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[50] All tolerance values are far greater than 0.1, so a collinearity problem is not indicated (Field, 2000, 201).

[51] All VIF values are far less than 10, therefore a collinearity problem is not indicated (Field, 2000, 201).

*Table 7.6: Logistic Regression: Significant variables (N=295)*

| Variable Name | Category | Beta | Standard Error | Wald | Sig. | Exp(B) | Sig. at .05 |
|---|---|---|---|---|---|---|---|
| Cleanliness | Not clean | -.791 | .954 | .687 | .407 | .454 | |
| Information | Not easy to get info | -.127 | .529 | .057 | .811 | .881 | |
| Reliability | Not reliable | .369 | .548 | .455 | .500 | 1.447 | |
| Frequency | Not frequent enough | -.081 | .575 | .020 | .888 | .922 | |
| Connections | Not good | 1.404 | .610 | 5.296 | .021 | 4.072 | *** |
| Safety at Stops | Not safe at stops | .210 | .560 | .140 | .708 | 1.233 | |
| Safety on Buses | Not safe on bus | .858 | .800 | 1.148 | .284 | 2.357 | |
| Routes | Routes not direct | .477 | .557 | .732 | .392 | 1.611 | |
| Speed Relative to Car | Too slow versus car | 1.655 | .707 | 5.482 | .019 | 5.232 | *** |
| Transporting Goods | Too difficult | -.093 | .597 | .024 | .876 | .911 | |
| Shame | Ashamed of bus | 1.825 | .792 | 5.314 | .021 | 6.204 | *** |
| Condescension | People look down | -.571 | .598 | .913 | .339 | .565 | |
| Stop Distance Reasonability | Do not live close to bus stop | .654 | .635 | 1.062 | .303 | 1.924 | |
| Destination Reasonability | Destination not close to bus stop | -.111 | .606 | .034 | .854 | .895 | |
| Transit System Knowledge | Not very or not at all familiar | 2.780 | .507 | 30.059 | .000 | 16.126 | *** |
| Car Access | No car access | 19.184 | 3518.003 | .000 | .996 | 2.145 | |
| Driver's Licence | No valid driver's licence | 1.717 | 1.441 | 1.420 | .233 | 5.566 | |
| Clean Air Day Awareness | Not aware of Clean Air Day | .401 | .511 | .614 | .433 | 1.493 | |
| Student | Not student | -.710 | .807 | .774 | .379 | .492 | |
| U-Pass | Not U-Pass holder | 1.574 | 1.046 | 2.264 | .132 | 4.827 | |
| Unemployed | Not unemployed | 2.524 | 1.692 | 2.224 | .136 | 12.475 | |
| Retired | Retired | 1.788 | .818 | 4.776 | .029 | 5.980 | *** |
| Disabled | Not disabled | 1.116 | 1.201 | .864 | .353 | 3.054 | |
| Age | 45 and above | — | — | 1.389 | .499 | — | |
| | 25-44 | .000 | .592 | .000 | .999 | .999 | |
| | 18-24 | -.783 | .761 | 1.059 | .304 | .457 | |
| Income | $60,000 and above | — | — | 2.652 | .266 | — | |
| | $20,000-59,999 | -.574 | .480 | 1.431 | .232 | .563 | |
| | $0-19,999 | -1.210 | .848 | 2.035 | .154 | .298 | |
| Constant | | -29.103 | 3518.004 | .000 | .993 | .000 | |

Percentage dependent variable category predicted correctly: 88.5
Nagelkerke Pseudo $R^2$: .774

Note: Field (2000) discusses "type II errors" where the researcher assumes a variable is not significant, when in fact it has an effect in the sample population. He notes that:

> When the regression coefficient (beta) is large, the standard error tends to become inflated, resulting in the Wald statistic being underestimated. The inflation of the standard error increases the probability of rejecting a predictor as being significant when in reality it is making a significant contribution to the model (i.e. you are more likely to make a type II error) (Field, 2000, 180).

In Table 7.8 regression results show Car Access to not be a significant variable with respect to influencing transit use, although this seems to be intuitively unsound. In Table 7.8 Car Access displays a comparatively large beta value, a high standard error value relative to other variables and a Wald statistic of .000 and therefore is suspect given instructions from Field (2000). Multi-collinearity tests indicate all variables are well within acceptable tolerance and VIF ranges according to guidelines by Field (2000, 201).

In the crosstab for Car Access (results displayed in Table 6.2, Appendix C) there is one cell in the contingency table with a value of '0' (the "never bus"/"no car" cell). That is, the Pearson Chi$^2$ test predicts that 0 people will never ride the bus and do not have access to a car; seemingly, this is causing the inflation of the Standard Error score. When the dependent variable is decoded into its original categories and a crosstabulation is run, results of the Pearson Chi$^2$ test[52] suggests Car Access is significant, indicating that the relationship between the Car Access and the (coded) dependent variable would become clearer if a larger, random sample were available.

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[52] Although one cell in the contingency table contains a 0 ("I never take the bus" and no car access), SPSS notes that no cells have an expected count of less than five.

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## Interviews and Consultations

| Name | Title / Organization | Date(s) |
|------|---------------------|---------|
| Mike Docherty | Manager, Farwest Transit Services Inc | 3/03/09 |
| Jerry Dombowsky | Transportation Demand Supervisor, City of Kelowna | 3/04/09 |
| Mike Kittmer | Active Transportation Coordinator, City of Kelowna | |
| Anita Wasiuta | Marketing and Communications, BC Transit | 3/03/09 |
| Tania Wegwitz | Corporate Business Development Manager, BC Transit | 2/26/09 |
| | | 3/04/09 |

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