Market Segmentation Analysis on the Québec City - Toronto High-Speed Rail Corridor

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Market Segmentation for the ALTO High-Speed Rail Corridor

Identifying Passenger Segments to Maximize Ridership on the Toronto-Québec City Corridor

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The Corridor at a Glance

- *The Toronto-Québec City corridor spans 13.1 million residents and generates 44% of Canada's GDP*
- *The ALTO project carries a projected budget of $90 billion with $122 million already allocated*
- *Despite the budget and committed funds, no reliable market information exists on who will use the line or how to maximize ridership.*

Source: Zhang, Negm, & El-Geneidy. (2026)

Background and Policy Problem

High-speed rail (HSR) is a capital-intensive, long-horizon public investment that depends on sustained ridership to create high-level economic gains and justify its high cost. The ALTO corridor will link Toronto, Peterborough, Ottawa-Gatineau, Trois-Rivières, Montréal, and Québec City; a network that, if successful, could meaningfully reorient inter-city travel in Canada's most densely populated and economically productive region. However, data-based service planning, pricing, and infrastructure design require a nuanced understanding of the people who will actually use the system.

HSR in this corridor primarily competes with air travel and non-business car trips, rather than rail services. Without understanding who these users are and how they will interact with the HSR system, ALTO risks underperforming on ridership metrics. This research addresses that gap directly.

Research Approach

This study draws on the Canadian High-Speed Rail Survey, conducted across the six regions hosting ALTO stations, grouping Montreal and Laval into a single region due to their spatial proximity. After a multi-step cleaning process, the final useable sample comprised 6,633 observations. The survey captured both stated preference data (hypothetical HSR use patterns and frequencies) and revealed preference data (actual travel behaviour capturing corridor and local travel), combining them to produce segments that are more predictive of real ridership than intent-based measures alone.

The analytical pipeline consists of two stages:

1. **Exploratory factor analysis (EFA)** *reduces perception variables into underlying attitudinal dimensions, identifying latent patterns in respondents' concerns and preferences. Factors were then used as variables in the cluster analysis*

2. **K-means clustering** *groups respondents into discrete market segments based on those factor scores alongside behavioural and sociodemographic variables. Cluster count (k=6) was determined through silhouette analysis and informed manual review*

The result is six distinct user profiles each carrying specific policy implications.

Key Findings: Six Market Segments

The analysis identified six behaviourally distinct rider segments. The section below summarizes each segment and its priority policy concerns.

Work-Oriented Travellers 20%

High-income (40%) users who all intend to use the line for work. Frequent car users with 1.7 telework days per week on average. Highest % of students (19%), 68% use rideshare apps. Prefers station near mass-transit and downtown. Willing to pay $21/100km.

Top routes: *Montréal - Québec City, Montréal -Ottawa*

Policy priorities:

- *French & Japanese punctuality and consistency standards for reliable work travel*
- *Onboard workspace upgrades for hybrid/remote workers*
- *Minimized check-in wait times for convenience*
- *High capacity ride-share pickup zones*

Car-Oriented HSR-Experienced 28%

Largest segment. 100% have used HSR (58% in France/Japan); 79% corridor trips by car. 53% intend to use the line for events while nobody intends to use for work. Motivated to use by previous HSR experiences. Willing to pay $21/100km

Top routes: *Toronto - Montréal, Montréal - Québec City*

Policy priorities:

- *French/Japanese punctuality and consistency standards*
- *Flexible booking with free/easy changes and cancellations*
- *Secure, navigable park-and-ride facilities*
- *Higher service frequencies around popular events*

Car-Oriented HSR-Inexperienced 20%

None have prior HSR experience; 44% of local trips by car; 81% of corridor trips. Despite this, 75% say they would try HSR just to try it (strong latent demand). Willing to pay $18/100km (lowest)

Top routes: *Toronto - Montréal, Toronto - Ottawa*

Policy priorities:

- *Flexible booking with free changes and easy cancellations*
- *Off-peak discounts for discretionary travel*
- *Easy navigable pickup and dropoff zones*
- *Higher service frequencies around popular events*
- *Dedicated on-site staff for first-time users*

Highly-Concerned Skeptics 9%

Oldest segment (33% over 65 years), 40% low-income, highest anxiety on all risk metrics (75% moderately/extremely concerned about costs). Most likely to be retired. Prefers VIA station location. Willing to pay $19/100km.

Top Routes: *Ottawa - Toronto, Montréal - Toronto*

Policy priorities:

- *Free/easy changes & cancellations*
- *Dedicated on-site staff for first-time users*
- *Transparent cost and project progress reporting*
- *French & Japanese punctuality and consistency standards to build trust in the line*

Rail-Oriented Travellers 16%

Highest proportion of women (61%). Largest active travel share (47%) and intercity train share (71%). 70% support existing VIA station location. 38% low-income. Willing to pay $23/100km (2nd-highest).

Top routes: *Ottawa - Toronto, Montréal - Toronto*

Policy priorities:

- *New mass and para-transit connections to all stations*
- *Pedestrian-friendly, fully accessible station entrances*
- *Integrated local transit ticketing for seamless last mile connectivity*
- *Free/easy changes & cancellations*

Plane-Oriented Travellers 7%

Primary air diversion target. 60.6% high-income; 2+ telework days on average; 57% of corridor trips by plane. 64% interested in HSR for work. Least satisfied with last corridor trip. Willing to pay $23/100km (highest)

Top routes: *Toronto - Montréal, Toronto - Ottawa*

Policy priorities:

- *Japanese punctuality standards for reliable work travel*
- *Minimized check-in wait times to beat short-haul air*
- *Onboard workspace upgrades for hybrid/remote workers*

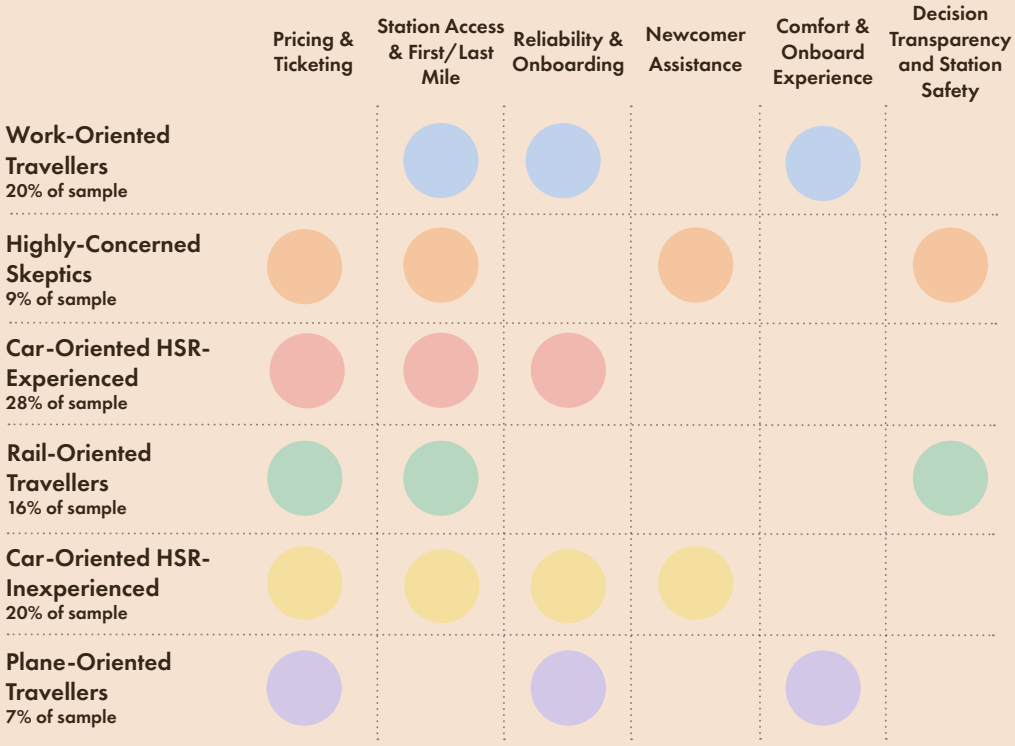
Cross-Cutting Policy Implications

Pricing and Ticketing: *The market contains at least three distinct pricing needs. Car-Oriented HSR-Inexperienced, Highly-Concerned Skeptics, and Rail-Oriented Travellers require affordable, flexible fares that do not preclude discretionary travel. The two Car-Oriented segments need pricing that competes directly with the cost of driving. Plane- and Work-Oriented Travellers need a high-comfort seating class with privacy and work capabilities.*

Station Access and First- and Last-Mile Connectivity: *For segments whose travel chain depends on seamless local connections, first- and last-mile infrastructure is a direct barrier to adoption regardless of how competitive the rail service itself is. Park-and-ride and dropoff infrastructure remain important for the car-oriented groups along with adequate space for future ride-share demand.*

Reliability and Onboarding: *Consistent on-time performance is essential to converting three distinct segments for different reasons: the Highly-Concerned, who are skeptical about whether the project will deliver; the Plane-Oriented, who need the line to be dependable enough to replace flying for work travel; and the Car-Oriented HSR-Experienced, who will benchmark ALTO directly against the French and Japanese systems they have already used.*

Prioritization: *Focus early ridership on Car-Oriented HSR-Experienced users (28%), expand demand by converting Car-Oriented HSR-Inexperienced travellers (20%), and maximize revenue from Work-Oriented (20%) users.*



**One colour per cluster. Empty cell = not a priority*

Conclusion

Market segmentation is not an academic exercise: it is a planning prerequisite for a project of ALTO's scale. The six segments identified here reveal a potential ridership base that is diverse in its travel habits, concerns, and expectations. Most travellers are not opposed to HSR; they are waiting for a service that meets them where they are. The Car-Oriented HSR-Inexperienced segment alone (20% of the sample) shows that latent demand is high even among travellers with no prior exposure to the technology. Behaviourally grounded, data-driven planning improves the precision and effectiveness of major transport investments. The findings presented here provide ALTO with an evidence base for service design, pricing strategy, and infrastructure decisions that can maximize ridership from the corridor's opening day.

Research Acknowledgement

I would like to first thank Ahmed El-Geneidy for his support throughout my degree, but particularly during my research. His research expertise, wealth of industry knowledge, and availability immeasurably helped my journey and allowed me to grow as a planner. He always pushed me to learn new skills and go the extra mile, and I am grateful for everything I learned from him.

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The cover photo for this report was created with the assistance of AI.

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Executive Summary

The new ALTO High-Speed Rail (HSR) line will be Canada's first HSR offering and will provide fast service between Toronto and Québec City along a dedicated corridor for a price tag of $90 billion. This will be one of the largest infrastructure projects in Canadian history and it is expected to significantly contribute to the national economy and alter corridor travel patterns for generations to come. There is currently no large-scale market information available to policy makers to ensure Canada maximizes the benefits from this significant investment. This research contributes to the project by providing key information about the potential user groups using a market segmentation approach. This research uses the Canadian High-Speed Rail survey and applies an exploratory factor analysis and k-means clustering approach to identifying distinct user groups. Six distinct clusters emerged from the analysis and provide insight into the various populations that will use the HSR. The results show that no single policy lever will maximize ridership, rather a tailored approach will be most useful in making the most of the investment.

Key Findings

- **Fares can be maximized through the high-income, work-oriented group that is looking to use the line for work travel**
- **The two car-oriented groups emerge as targets for modal conversion, based on the positive HSR experiences of one group and the general curiosity for the other group**
- **Station access interventions are an important cross-cutting policy item to attract ridership across clusters**
- **A differentiated pricing strategy is needed to attract users with different needs and constraints**
- **Strict punctuality standards will be important for multiple groups, but will be paramount for those using the line for work**

Sommaire exécutif

Le nouveau train à grande vitesse (TGV) d'ALTO sera le premier service de TGV au Canada et reliera Toronto à Québec par un corridor dédié, à un coût estimé de 90 milliards de dollars. Il s'agira de l'un des plus grands projets d'infrastructure de l'histoire canadienne, et on s'attend à ce qu'il contribue de façon importante à l'économie nationale tout en transformant les habitudes de déplacement dans le corridor pour les générations à venir. À l'heure actuelle, les décideurs ne disposent d'aucune information de marché à grande échelle leur permettant de s'assurer que le Canada tire le meilleur parti de cet investissement considérable. La présente recherche soutient la planification de la ligne en fournissant les groupes d'usagers potentiels, à l'aide d'une approche de segmentation de marché. Elle s'appuie sur le sondage canadien sur le train à grande vitesse et applique une analyse factorielle exploratoire ainsi qu'une approche de regroupement par k-moyennes afin de cerner des groupes d'usagers distincts. Six segments distincts se dégagent de l'analyse et permettent de mieux comprendre les différentes populations qui emprunteront le TGV. Les résultats démontrent qu'aucune mesure politique unique ne suffira à maximiser l'achalandage; c'est plutôt une approche adaptée qui permettra de rentabiliser pleinement l'investissement.

Constats clés

- **Les recettes tarifaires peuvent être maximisées auprès du segment à revenu élevé, axé sur les déplacements professionnels, qui prévoit utiliser la ligne pour ses déplacements liés au travail.**
- **Les deux segments majoritairement utilisateurs de l'automobile constituent des cibles de premier choix pour le transfert modal : l'un en raison de son expérience positive du TGV, et l'autre en raison de sa curiosité générale.**
- **Les interventions visant à améliorer l'accès aux gares constituent la mesure transversale la plus déterminante pour attirer l'achalandage dans l'ensemble des segments.**
- **Une stratégie tarifaire différenciée sera nécessaire pour rejoindre des usagers ayant des besoins et des contraintes variés.**
- **Le respect rigoureux des horaires sera important pour plusieurs segments, mais s'avérera primordial pour les usagers qui utiliseront la ligne à des fins professionnelles.**

Ethics Approval for Survey-Based Research

This research used survey data collected under McGill University Research Ethics Board approval granted on September 19, 2025. Survey questions are included in the appendix.

Project Title: Linking accessibility measures to individuals' behaviour and wellbeing in the Canadian context

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Principal Investigator: Ahmed Medhat Elgeneidy

1. Introduction

Canada is finally building high-speed rail, but what does this mean for Canadians? Large regional or national infrastructure projects are often justified by promises of job creation, economic growth, and productivity gains but infrastructure creation alone is not enough to create these benefits. Realizing them requires complementary, data-driven policy frameworks that allow decision-makers to align service design with user needs. In the context of public transportation, this makes it critical to understand how different groups within the population perceive and are likely to respond to new infrastructure.

Market segmentation analysis has emerged as a valuable tool in this process, offering insight into the attitudes, behaviours, and preferences of potential users and how they may interact with a system once implemented (Balaghi et al., 2026; Krizek & El-Geneidy, 2007; van Lierop & El-Geneidy, 2017). By moving beyond aggregate analysis, segmentation allows for the identification of distinct user groups and supports the development of targeted policies that address diverse needs.

Despite being Canada's most densely populated corridor with over 13.1 million residents and producing roughly 44% of the national GDP, the Toronto–Québec City corridor relies on conventional passenger rail that runs along the right of way of existing freight trains in most sections (Statistics Canada, 2024, 2025). The freight carriers CPKC and CN have priority on scheduling and operating their trains along this corridor which limits reliability and speed of the existing passenger rail, forcing VIA to pay out millions in delay compensation (Perreault & Leblanc, 2025; Transport Canada, 2021).

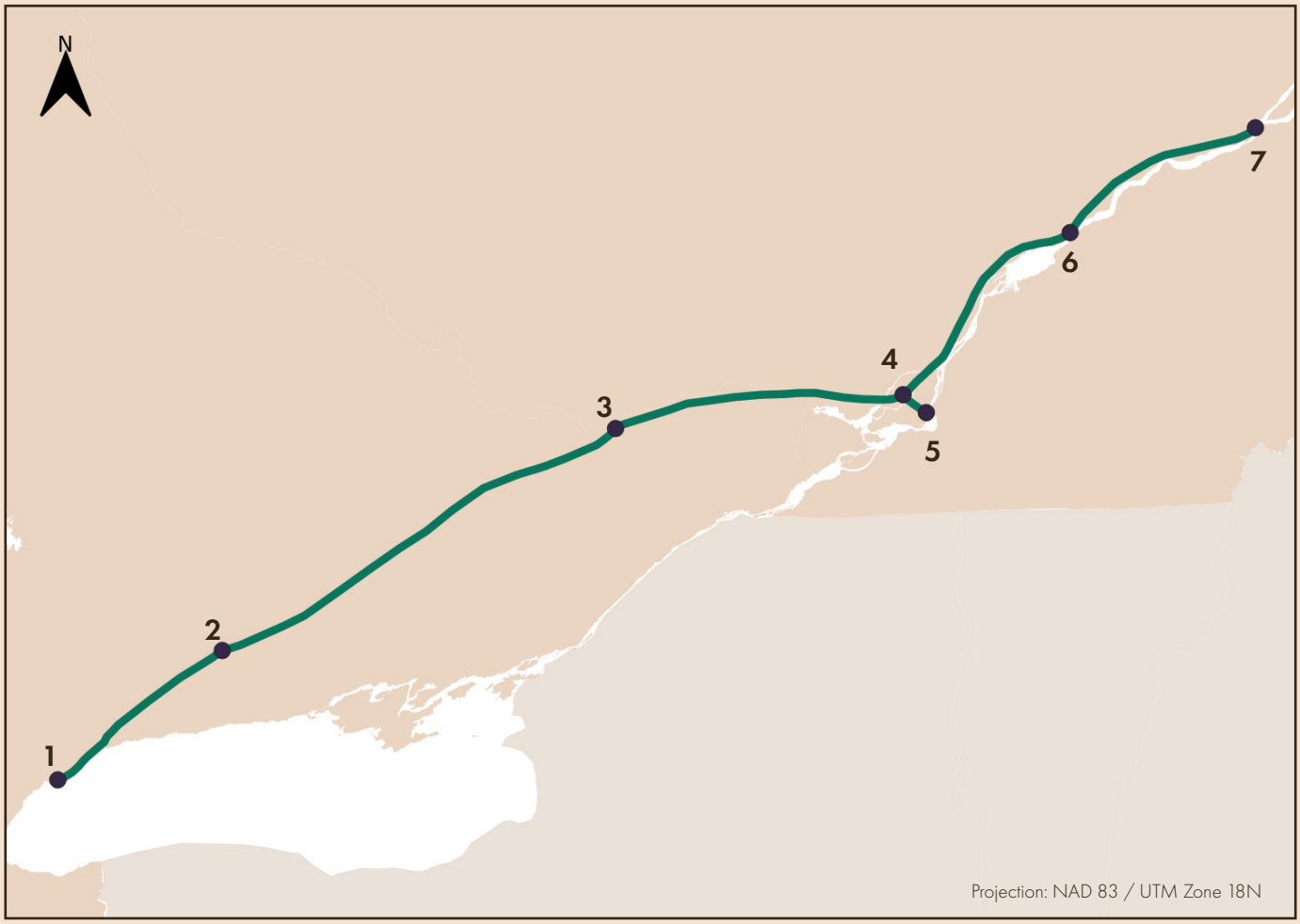
In 2025, high-speed rail (HSR) gained federal support with the assignment of $122 million towards the procurement phase of the project (Transport Canada, 2025). Recent estimates suggest a total project cost between $60 and $90 billion. Despite strong commitment to the project, there is no reliable information about the various user groups that will comprise the ridership for the new line.

This study addresses the lack of granular market information by using data from the Canadian High-Speed Rail Survey to identify distinct ridership groups and the characteristics that influence their likelihood of adopting HSR. An exploratory factor analysis is first used to identify underlying attitudinal dimensions, followed by k-means clustering to group respondents based on behavioural, attitudinal, and socio-demographic differences. The results are then translated into targeted policy recommendations aimed at maximizing ridership and aligning service design with user needs. In doing so, this research contributes to the limited body of work on HSR market segmentation by providing a behaviourally grounded analysis of potential users in the Canadian context.

Given the scale and significance of the ALTO project, understanding the composition of its potential market is essential for ensuring that projected benefits are realized. The insights generated in this study are intended to inform

both the planning and implementation of the Toronto–Québec City HSR line (Figure 1), while also contributing to broader discussions on how large-scale transit investments can be designed to respond to heterogeneous user needs.

The paper follows by introducing the relevant literature in section 2, describing the chosen data and methods in section 3, presenting the findings in section 4, and presenting the implications and conclusions for Canadian HSR planning in section 5.



Proposed HSR Stations

1. **Toronto** (2,794,356 residents)
2. **Peterborough** (83,651 residents)
3. **Ottawa - Gatineau** (1,488,307 residents)
4. **Laval** (434,645 residents)
5. **Montréal** (1,762,949 residents)
6. **Trois-Rivières** (139,163 residents)
7. **Québec City** (549,459 residents)

Figure 1. *Map of the proposed ALTO corridor and station locations. Sources: Statistics Canada; ALTO.*

2. Literature Review

2.1. HSR Benefits and Drawbacks

High-speed rail is a technological advancement of the 20th century that significantly lowered travel times for regional rail. It is commonly defined as rail that exceeds speeds of 250km/h and operates along dedicated right of way with no level track crossings (UIC, 2018). The lack of crossings and the dedicated nature of the network allows trains to sustain their top speeds along most of their routes, needing only to slow when approaching a station.

HSR lines (operating speed > 300km/h) have been adopted in twelve countries and new lines are continuously being planned (World Population Review, 2025). Investments into HSR technology are typically justified by significant travel time savings, gains in employment accessibility, agglomeration benefits, and the ability to generate economic and environmental benefits (Department for Transport, 2012; Federal Railroad Administration, 2009; Nash, 2015; Preston, 2009). HSR offers an option to convert driving and short-haul air trips to a more sustainable mode. For example the projected HSR line from San Francisco to Los Angeles projects travel times ~40% faster than flying and ~57% faster than driving (US HSR). Life cycle analysis for the California corridor suggested that the environmental benefits of HSR could be realized within 20-30 years of construction but are highly dependent on the degree of mode shift from road or air users (Chester & Horvath, 2012). However, more recent meta-analyses have questioned the robustness of environmental study findings, emphasizing that results often hinge on methodological assumptions such as system boundaries, ridership forecasts, and energy sourcing (Jiang et al., 2021). Environmental benefits may also be less pronounced than projected if ridership is primarily diverted from conventional rail rather than by car or plane. Despite uncertainty regarding the validity of some HSR studies, HSR provides a better alternative for many travellers in well travelled corridors.

The literature on economic benefits is similarly mixed. Some studies have identified positive outcomes such as increased firm attraction or productivity, higher regional GDP, increased labour productivity, and tourism growth (Ahlfeldt & Feddersen, 2018; Bernard et al., 2019; Carbo et al., 2019; Liu & Shi, 2019; Ou et al., 2025), while others highlight uneven benefits and a lack of evidence of HSR attracting advanced service companies like Amazon or Google (Albalate & Bel, 2012; Hiramatsu, 2018). Successful outcomes tend to occur when projects are supported by solid institutional frameworks and grounded reasoning (Pierleoni, 2019). The mixed nature of HSR research suggests that outcomes are highly context-specific and that solid urban planning practices must be used to maximize benefits for the surrounding area.

High development and construction costs are the primary drawback to HSR investment and average globally around USD$50 million/km with substantial variation, some countries (e.g. France, Belgium, Spain, Norway) fall well below this figure while the United Kingdom spent

an average of USD$220 million/km for their recent HSR project (Transit Costs Project, 2022). HSR networks can encourage divestment from conventional rail lines, reducing accessibility for smaller cities (Martínez Sánchez-Mateos & Givoni, 2012) and some researchers argue that a commercial case for HSR can rarely be made (Button, 2012). Based on the $60 - $90 billion estimate, Canadian HSR would cost on average between $60 - $90 million per kilometer. Overall, the literature portrays HSR as a mode with clear mobility and environmental potential but highly context-dependent outcomes with a high price tag. The context specific nature of the outcomes along with the high cost make it essential that ALTO gather an understanding of who will and won't use the line and why.

2.2. HSR Determinants of Ridership

The literature on the determinants of HSR ridership remains relatively limited. Studies of HSR systems in France, Spain, Japan, and China have emphasized the importance of connectivity, revealing significant relationships between connecting facilities (e.g., transit stops, bike parking, taxi areas), transfer time, and ridership (Teng et al., 2022). In France, HSR ridership was found to correlate strongly with regional rail headway rather than connective facilities. Research on the London-Amsterdam corridor identified that both leisure and business passengers preferred rail over air travel with additional HSR frequency providing substantial marginal gains for both groups (Avogadro et al., 2023). Men, particularly on business trips, were overrepresented, consistent with broader demographic findings showing that HSR users tend to be higher-income, well-educated, and more likely to belong to higher socio-occupational groups (Avogadro et al., 2023; Dobruszkes et al., 2022). A comparative study found that lower ticket prices, higher service frequency, abundant station parking, and minimal security screening were all positively correlated with the likelihood of travelers switching from air to high-speed rail (Pagliara et al., 2012). Overall, these findings suggest that HSR ridership is defined by interaction between service attributes and user characteristics and that market segmentation should account for both structural and socio-economic factors. Further, they reinforce the idea that reasonable pricing and convenient check-in processes will be critical for attracting air passengers.

2.3. Stated & Revealed Preference Surveys

When employed in a transportation context, stated preference surveys gather responses from individuals regarding their preferences surrounding a given set of hypothetical transportation options. The main issue with stated preference surveys is that respondents can overstate their evaluation of a given option and their response may not translate to actual behaviour, known as hypothetical bias (Fifer et al., 2014; Johansson-Stenman & Svedsäter, 2012). This can be mitigated in situations in which the respondent believes that both the research will result in concrete action, and that the outcome of this action is desirable for them (consequential survey questions), in which case the respondent answers truthfully due to their belief in the influence of their responses (Carson & Groves, 2007). In comparison, revealed preference surveys infer respondents preferences using their past actual travel behaviour, eliminating uncertainty about how hypothetical choices translate to real actions (Fifer et al., 2014; Shang & Chandra, 2023). This method naturally introduces recall bias but by combining stated preference and revealed preference data, researchers can capture both potential transit behaviours and actual travel decisions.

2.4. Market Segmentation Analysis

Market segmentation analyses are common in transport research especially for new projects. Early research on market segmentation found that public transit riders broadly fell into two groups: captive riders and choice riders (Beimborn et al., 2003). These provided basic segmentation but ignored factors like context and rider attitudes. Eventually new categories like auto captives, potential users, and captive by choice were included (Krizek & El-Geneidy, 2007; van Lierop & El-Geneidy, 2017).

Since binary segmentation methods are inherently limited, researchers have turned to data-driven approaches that procure and make use of a wide range of attitudinal, demographic, geographic, behavioural, and socio-economic variables (Allen et al., 2019; Eldeeb & Mohamed, 2020; Fu & Juan, 2017; Kim & Ulfarsson, 2012; Mesbah et al., 2022; Viallard et al., 2019; Wang et al., 2022). When using this kind of data, factor analysis and k-means clustering are commonly used to group respondents into categories based on patterns of responses (Alousi-Jones et al., 2025; Dent et al., 2021; Grisé & El-Geneidy, 2018; van Lierop & El-Geneidy, 2017).

Of particular interest to this paper are Grisé and El-Geneidy (2018) market segmentation based on satisfaction variables and Dent et al. (2021) segmentation based on potential user type. Grisé and El-Geneidy (2018) segmented respondents based on variables such as reliability, comfort, and value for money, which demonstrated that attitudinal dimensions can reveal behavioural patterns that would not be captured in typical demographic-based segmentation analyses. In comparison, Dent et al. (2021) segmentation examined which user groups are most likely to use Montreal's REM, focusing on behavioural intention and the potential to switch modes when circumstances change. This work is an important background for understanding modal change surrounding new HSR projects.

This research builds directly on the frameworks established by Grisé & El-Geneidy, Krizek & El-Geneidy, Dent et al., van Lierop & El-Geneidy, and Balaghi et al. to segment potential high-speed rail users based on attitudinal characteristics related to previous HSR experiences, as well as their propensity to switch modes according to past behaviour and stated intentions. By combining attitudinal and behavioural variables, we aim to provide more comprehensive profiles of user groups than either type would be able to produce on their own.

2.5. Market Segmentation in HSR Projects

Market segmentations are less common in HSR projects than they are for traditional public transit projects, likely due to the relatively infrequent nature of HSR projects and the comparative difficulty of gathering survey data along regional corridors.

When analyzing the potential for the Southeast High Speed Rail (SEHSR) in the Southeast of the United States, the Federal Railway Administration completed a market segmentation analysis using data from 15,000 transportation surveys distributed throughout the region (Federal Railroad Administration, 2015). Similarly, U.S. researchers used cluster analysis on an on-board survey of current Amtrak customers to identify user segments for the current service, and then used the cluster results to project responses to a potential HSR line (Sperry et al., 2011). However, the lack of questions pertaining to HSR intentions limited the interpretability of the results. In California, a ridership and revenue forecasting report on the state's new high-speed rail line segmented

markets based on a fare sensitivity analysis but did so along trip distance lines instead of factors like intended behaviour and sociodemographic characteristics (DB E.C.O., 2024).

Research on Chinese HSR showed that deeper insights into HSR user populations can be gained through clustering and market segmentation analyses, allowing local officials to develop supporting policy, pricing structures, service provisions, and communication strategies for differing customer segments (Pan & Truong, 2019; Wang, 2018). Further research in the Chinese context used a logistic regression model instead of factor and cluster analyses to identify user segments within the HSR population along the Chongqing-Lichuan HSR line and inform service design (Li et al., 2016). Even though HSR market segmentation using attitudinal and behavioural variables has not been applied in a North American context, research from other continents suggest that the method will provide valuable insight into potential users.

2.6. Stated Intentions vs. Actual Behaviour

Using stated intentions to predict future behaviours is based on the theory of planned behaviour (TPB) which posits that a person's observed behaviour is a direct outcome of their behavioural intention (Ajzen, 1991). This model is made up of three underlying constructs: 1) attitudes; 2) subjective norms; and 3) perceived behavioural control. Ajzen (1991) states that actual behaviours can be predicted with high accuracy from these three constructs. This is supported by multiple empirical sources linking accuracy of behaviour predictions to stated intentions (Ajzen & Fishbein, 1969; Sheppard et al., 1988).

However, while stated and revealed preferences surveys can provide valuable insight into a populations intention to use a new transit service, individual behaviour shows that intentions do not always predict behaviour in individual actors. Research on the new Reseau express metropolitain (REM) light rail system in Montreal has shown that some individuals may intend to use a new service, only to revert to their previous travel patterns once the service is active (Balaghi et al., 2026). The study emphasized the stability within the groups of 'car-oriented individuals' and 'potential REM adopters', while higher fluidity was evident within the 'potential REM telecommuters' group, where they had a propensity to revert to travel by car. These results are supported by Donald et al. (2014) work on the psychological factors influencing mode choice which found that public transport use was influenced solely by intention whereas car use was influenced by both intention and past behavioural habits, outlining the role that habitual travel choices play in future behaviour. Heinen et al. (2017) found that changes in mode choice following the introduction of new transport infrastructure were highly heterogeneous, with partial rather than full modal shifts being most common, suggesting that habitual travel behaviour plays an important role in shaping actual behaviour.

In response to the documented intention–behaviour gap, this study explicitly incorporates both stated intentions and revealed travel behaviour into the market segmentation framework. By clustering respondents using attitudinal factors alongside behavioural indicators (e.g., recent long-distance mode choice, car access, and telework status), the analysis distinguishes between segments with high stated propensity to use HSR and those whose past behaviour suggests greater or lesser likelihood of actual adoption. This approach allows for more realistic interpretation of potential ridership by explicitly accounting for habitual

travel behaviour, thereby avoiding reliance on stated intentions alone.

2.7. Ridership & Market For HSR

The literature on HSR ridership consistently shows that demand is shaped by a combination of trip purpose, corridor characteristics, and user heterogeneity, rather than a single dominant market or uniform behavioural response. When looking at the diversion markets from other modes, research by Hensher (1997) suggests that induced demand (increasing trip frequency) among Sydney-Canberra corridor travellers adds ~26% on top of diverted demand. Hensher identifies the dominant diversion markets for HSR as business air travel and non-business car travel. Given the car-dominated nature of the corridor (~83% of trips), even modest diversion from car travel can translate into substantial HSR patronage.

Pan and Truong (2019) when studying Chinese HSR identified four distinct segments within their HSR system: 1) High-ed youths (younger adults with higher education and moderate incomes); 2) Mature travellers (passengers with lower education levels and incomes); 3) New starters (passengers with the lowest values for age, education, and income); and 4) Elite travellers (middle-aged, high education and income). In this analysis, mature travellers were by far the smallest of the segments.

Market segmentation analysis on the Chongqing-Lichuan high-speed railway in China identified three distinct market segments: migrant workers, non-economic travel, and business travel (Li et al., 2016). Within these three segments, they further identified five sub-segments based on age, income, and trip purpose. The two largest sub-segments were 1) young-middle aged travellers with low trip frequency and moderate incomes, and 2) adults with medium income levels that travel for tourism or social purposes.

These results suggest that low-moderate income groups make up a substantial proportion of riders but that these groups are fairly heterogeneous in purpose and age.

Evidence from Turkey shows that HSR users often develop habitual associations between the mode and a dominant trip purpose, but still use HSR flexibly across multiple purposes in practice (Celikkol-Kocak et al., 2017). The study further demonstrates that HSR ridership and modal shift patterns vary strongly by corridor characteristics, particularly the presence or absence of competitive air and road alternatives.

Within the tourism market, research from Madrid, Spain suggests that HSR likely plays a significant role in tourists' choice to visit other cities surrounding Madrid, but that their overarching choice to visit Madrid was not explained by the presence of HSR (Pagliara et al., 2015).

Overall, the literature suggests that the market for HSR is heterogeneous and highly context specific, while overarching themes of business and education travel persist. This signals the need for in-depth market segmentation analysis of Canadian HSR to identify potential user segments and inform targeted policies, service provisions, and pricing structures.

2.8. Policy Relevance

Assessing the economic viability of a major infrastructure project is essential to understanding its potential for success. No agency in Canada currently applies demand modelling or market segmentation to intercity rail analysis, leaving major information gaps about the prospective market for the Toronto–Québec high-speed

rail line. Given the project's substantial capital requirements, it is critical that the characteristics and behaviours of potential users are understood.

Elsewhere, the European Union, under Regulation (EU) 2024/1679 requires all high-speed rail projects to undergo a socio-economic cost–benefit assessment prior to implementation to ensure that investments are economically viable and contribute measurable value to the network (European Union, 2024). These assessments typically incorporate demand modelling and market segmentation to forecast potential ridership and evaluate economic viability. Such an assessment is lacking in the Canadian HSR context. This study addresses the gap in Canadian data by identifying distinct potential user groups and their likely behavioural responses once the new line is operational.

The findings will provide Transport Canada with the empirical basis to establish ridership forecasts, conduct cost–benefit analyses, and evaluate funding scenarios. For delivery partners such as ALTO and Cadence, segmentation results can inform pricing strategies, seat-class structures, and marketing approaches targeted to each user segment.

Without this information, the Government of Canada and its private partners risk misallocating capital or mispricing services. The Canada Infrastructure Bank can incorporate these results into financial risk assessments, while municipal governments can apply the segmentation to anticipate land-use changes and the local transportation needs of travellers arriving in, and departing from their cities. Overall, this research will provide a strong empirical foundation for ridership estimates and will ensure that policy and decision makers have reliable insights into the users they have been tasked to serve.

Literature Takeaway

HSR can generate mobility, environmental, and economic benefits, but these outcomes depend heavily on ridership, mode shift, project cost, and supporting land-use and transport policy.

Segmentation is most useful when it moves beyond broad user categories and captures behavioural, attitudinal, and socio-economic variation.

Methodological Implication

Stated intentions help identify potential demand, but combining them with revealed behaviour can differentiate whether those intentions are likely to translate into actual travel choices.

3. Data & Methods

3.1. Canadian High-Speed Rail Survey

To inform this paper, the Canadian High-Speed Rail (HSR) survey (Appendix A) was created by the author and the Transportation Research at McGill (TRAM) group. The HSR survey is a bilingual online survey that was distributed beginning in October of 2025 with a completion date of December 2025. Survey recruitment utilized multiple avenues: social media advertisements on both Facebook and Instagram, email invitations to previous respondents to TRAM surveys, and word of mouth invitations from the researchers.

The survey comprises the 6 regions that will have HSR stations in the upcoming project: Greater Toronto, Peterborough, Ottawa-Gatineau, Montréal region, Trois-Rivières, and Québec City. Both Montréal and Laval were grouped into the Montréal region due to their spatial proximity and the difficulty introduced by trying to disentangle local and corridor trips with cities that have mass transit connecting them.

The survey collected a total of 7,986 complete responses. A multi-step cleaning process was used based on exclusion criteria outlined below and applied in the following order: 1) Only fully completed surveys were included; 2) Only surveys from a single IP address were included; 3) Only surveys from email addresses not used in other survey instances were included; 4) Only surveys from respondents 90 years of age or below were included; 5) Only surveys where previous HSR experience occurred in a country with verifiable HSR service were included; 6) Only surveys with a valid home location were included; 7) Only surveys where completion time fell above the 5th percentile were included.

In addition to the above exclusion criteria, after discovering that over 96% of the survey planned to use the new line, only respondents that declared their intention to use it were kept for the succeeding analysis. This means that findings describe potential adopters instead of the full corridor population. After cleaning and filtering, we were left with 6,633 usable respondents. This survey collected only cross-sectional data on user travel patterns and behaviours, owing to the fact that the HSR line will not begin construction until at least 2030.

3.2. Exploratory Factor Analysis

Exploratory factor analysis (EFA) is a statistical method that uses a set of observed variables to identify underlying latent constructs that explain the patterns of correlations among responses in a dataset (Hair et al., 2014). EFA was employed to reduce a set of correlated attitudinal and behavioural variables into a smaller number of structured dimensions, minimizing information loss and producing interpretable inputs for the clustering analysis.

The analysis included variables capturing the attitudes and concerns towards Canada's proposed HSR line, perceptions based on previous HSR experience, and intended travel purposes on the new line. Attitudinal variables were scored on a 5-point Likert scale and travel purpose questions were binary with a 1 indicating they would use the line for that purpose.

An exploratory factor analysis (EFA) was conducted using the psych package in R, based on a Pearson correlation matrix. Factor retention was guided by parallel analysis, which has been shown to outperform traditional methods such as scree plot inspection (Zwick & Velicer, 1986). Scree plots were also examined descriptively, but the final number of factors was determined based on parallel analysis results and interpretability of the factor structure. Factors were estimated using principal axis factoring and rotated using varimax rotation to improve interpretability (Hair et al., 2014). Generally, only variables with factor loadings of 0.5 or higher were retained. One variable (concern for noise during construction) exhibited a primary loading slightly below the 0.5 threshold (0.484) but was retained due to its strong theoretical alignment with the factor and the high internal consistency of the resulting scale ($\alpha = 0.859$).

Factorability of the data was assessed through multiple techniques: ensuring that each variable exhibited at least one correlation above 0.30, indicating sufficient correlation for a factor analysis. Sampling adequacy was confirmed using the Kaiser-Meyer-Olkin (KMO) measure (KMO = 0.85), exceeding the recommended threshold of 0.70. While most variables demonstrated strong sampling adequacy (KMO > 0.7), a small number of binary travel purpose variables exhibited lower KMO values (≈0.5), indicating weaker shared variance with the broader attitudinal constructs. These variables were retained as they form a distinct behavioural dimension and demonstrated acceptable factor loadings. Bartlett's Test of Sphericity was statistically significant ($p < 0.05$), indicating that the correlation matrix was appropriate for factor analysis.

3.3. Weighted Clustering

K-Means clustering is commonly used when researchers need to group respondents into categories based on individual variables deviation from the sample mean. This process minimizes the differences within categories and maximizes the differences between them. Using a centroid method algorithm, respondents were assigned to clusters, centroids (based on the cluster's mean) were calculated and then the clusters were updated whenever a new respondent was assigned, calculating a new centroid (Hair et al., 2014).

To identify segments of the HSR market, we applied the factor scores calculated from the EFA as inputs along with a multitude of behavioural variables from the survey. The final selection of clusters was based on the statistical variance of each segment, the alignment with previously understood market segments for regional travel, and the policy relevance to the ALTO HSR project.

Multiple sources in the literature support this sort of manual analysis that focuses on end user interpretability and policy relevance for local authorities, most recently Balaghi et al. (2026) along with Carvalho and El-Geneidy (2024), van Lierop and El-Geneidy (2017), and Krizek and El-Geneidy (2007). We also conducted a silhouette analysis to support our decision for the optimal number of clusters, using it as a supplemental method alongside our manual

Figure 2. *Analytical workflow for market segmentation and policy translation*

4. Results

4.1. Exploratory Factor Analysis

As a result of the EFA, a series of attitudinal and behavioural factors were generated which represent underlying dimensions of respondents attitudes towards the ALTO project, along with a smaller subset of behavioural intentions relating to potential trip purposes. Five factors emerged from the data (Table 1), capturing perceived benefits, distinct categories of concern, overall project support, a distinct behavioural dimension capturing intentions to use the line for leisure-focused purposes (shopping and single-day events). These factors revealed distinct groupings of concern types (e.g., environmental, operational, and project delivery concerns) along with attitudes related to excitement to use the line for leisure purposes and served as the primary input structure for the subsequent cluster analysis before independent behavioural variables were introduced. Where a variable exhibited loadings above the 0.5 threshold on two factors, it was assigned to the factor with the higher loading.

Factor	Variable	Loadings	Cronbach Alpha
Perceived Benefits[1]	The HSR project is good for the Canadian economy.	0.842	0.891
	The HSR project is good for Canadian tourism.	0.849	
	The HSR project is good for the environment.	0.673	
	The HSR project is good for Canada's international image.	0.817	
	The HSR project is good for my region's growth.	0.774	
Local Impact Concerns[2]	Concern: The noise impacts of the HSR during operation.	0.67	0.875
	Concern: The effects of vibration from the HSR on nearby buildings and residents.	0.727	
	Concern: The impact of the HSR on natural habitats during construction.	0.769	
	Concern: The HSR's impact on air pollution levels during construction.	0.745	
	Concern: The impact of the HSR on natural habitats during operation.	0.855	
Concern for Delays and Cost Overruns[2]	Concern: Cost overruns during construction of the HSR.	0.818	0.673
	Concern: Construction delays affecting the start of operation of the HSR.	0.581	
Intention to use HSR for Leisure[3]	What would be your purpose(s) for using HSR: Single Day Entertainment Event.	0.571	0.558
	What would be your purpose(s) for using HSR: Shopping.	0.647	

Variance Explain. (57.7%); KMO (0.84); Bartlett's Test of Sphericity (χ^2 = 41749.58, d.f. = 91, p-value = 0)

[1] Five-point Likert scale (strongly disagree to strongly agree); [2] five-point Likert scale, inverted (not at all concerned to extremely concerned); [3] binary scale

Table 1. *Factor loadings of survey respondents in exploratory factor analysis*

4.2. K-Means Clustering Analysis

The clustering included the five factors identified in the EFA. In addition to the five factor scores, we included five independent variables that did not load strongly in the EFA but were important for capturing behavioural variation in observed travel patterns. Three of these variables represent the modal share for corridor travel across car, train, and plane modes. The fourth independent variable represents previous use of a high-speed rail system abroad, defined as self-reported use of an operational HSR system. The fifth independent variable represents a binary intention to use the line for work. Clusters of K=6 were determined to provide the best representation of the ALTO HSR market along with the highest level of policy relevance for decision makers (Figure 3). Cluster naming was done based on the presence of unique and identifiable characteristics observed through the cluster analysis such as propensity for a given mode, high/low use of HSR abroad, or high levels of concern for the project. Table 2 provides key sociodemographic, behavioural, and attitudinal statistics for each cluster.

4.3. Clusters

Work-Oriented Travellers

The Work-Oriented Travellers cluster comprises approximately 20% of the sample and is defined by their interest in using the line for work (Figure 3). Every member expects to use the line for work, by far the highest proportion of the study. Further, relative to other segments, individuals in this group are more likely to telework and average 1.7 telework days per week.

Socioeconomically, this cluster has disproportionately higher incomes, with 40% earning over $120,000 annually. It also has the highest prevalence of students (19%) and the highest degree of interest in using the line for

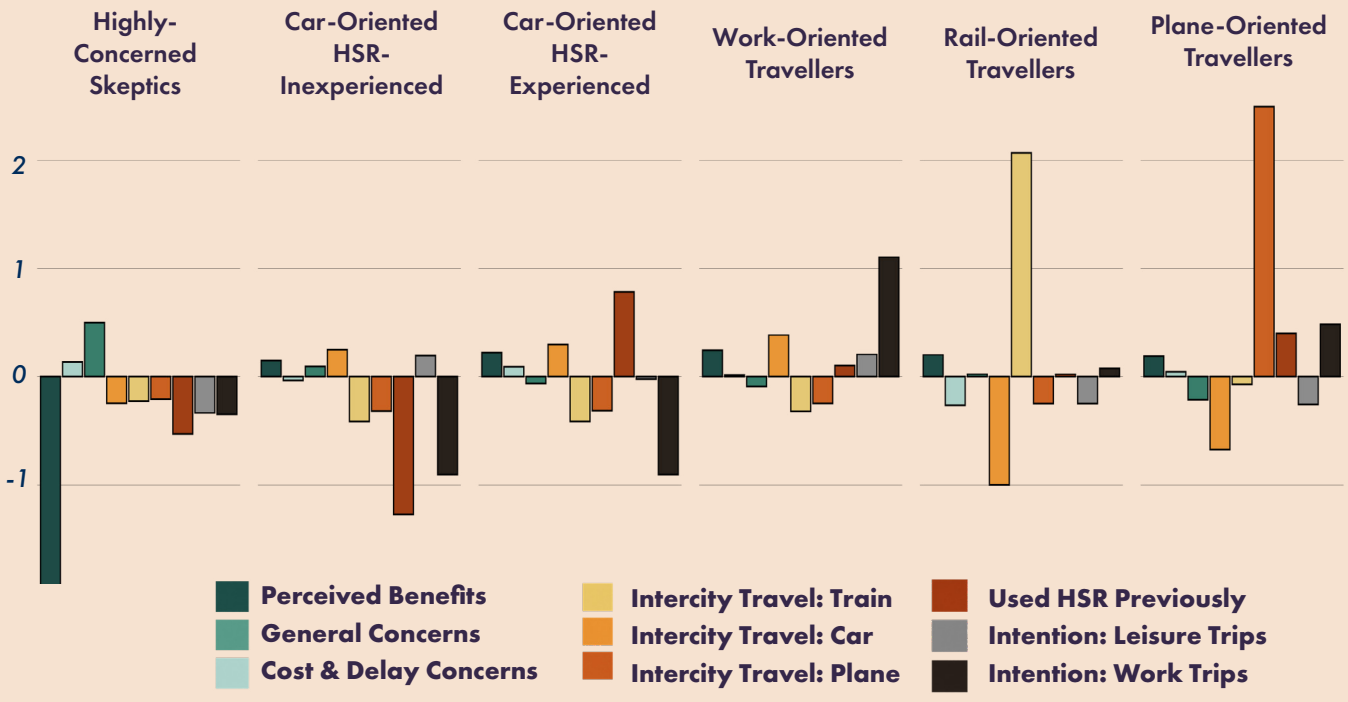


Figure 3. K-means cluster analysis results

	Clusters						
Variable	**Work-Oriented Travellers**	**Highly-Concerned Skeptics**	**Car-Oriented HSR-Experienced**	**Rail-Oriented Travellers**	**Car-Oriented HSR-Inexperienced**	**Plane-Oriented Travellers**	**Total Sample**
Weighted Sample share	19.95%	9.42%	28.04%	15.95%	19.93%	6.71%	100.00%
Unweighted N	2070	426	1611	846	1162	518	
Weighted Sociodemographic characteristics							
Gender							
Female	45.59%	53.87%	50.73%	60.73%	52.45%	43.86%	51.48%
Male	54.20%	45.94%	49.18%	39.13%	47.42%	56.03%	48.38%
Age							
18-35	42.88%	30.16%	27.14%	43.28%	31.90%	30.75%	34.33%
36-64	51.80%	36.33%	46.13%	38.47%	38.62%	61.61%	44.66%
65 and over	5.33%	33.51%	26.73%	18.26%	29.49%	7.64%	21.02%
Income							
Low income (under $60k)	25.80%	40.21%	28.45%	38.36%	39.48%	14.43%	31.87%
Middle income ($60k-$120k)	33.97%	34.13%	41.54%	34.57%	36.26%	24.97%	36.06%
High income (over $120k)	40.22%	25.67%	30.01%	27.07%	24.25%	60.60%	32.07%
Children in household	30.43%	14.24%	17.73%	14.75%	17.70%	22.16%	20.16%
Reported disability	24.00%	9.60%	12.50%	9.10%	12.60%	17.20%	6.77%
Travel Behaviour							
Telework 1+ days/week	54.52%	23.83%	30.31%	43.40%	25.66%	62.19%	37.83%
Previously used HSR abroad	68.34%	32.71%	100.00%	62.11%	0.00%	81.95%	60.16%
Intercity mode share							
Car	76.57%	61.20%	78.80%	18.66%	81.06%	27.83%	61.51%
Train	8.76%	18.96%	6.00%	71.21%	4.74%	12.88%	20.61%
Plane	3.43%	4.46%	2.29%	2.18%	1.64%	56.71%	7.02%
Station Preferences							
Prefers downtown station location	59.88%	43.35%	56.50%	66.87%	44.73%	70.19%	56.16%

Intercity mode shares calculated as proportion of corridor trips by each mode.

***Table 2.** Descriptive stats by cluster*

school, with nearly a quarter (24%) saying they would. Outside of work, the top intended uses are leisure/vacation (95%) and visiting friends/family (78%). Correspondingly, speed emerges as the primary motivator for adoption, followed closely by productivity and convenience, suggesting a premium placed on service oriented towards work travel.

Station access preferences further reinforce this group's support for accessible stations that support work. This cluster favours station locations integrated with mass transit hubs (62% approval); however, preferences are relatively diffuse, with no single option emerging as dominant. Support for transit-connected stations only marginally exceeds that for downtown locations (60% approval), though support for the latter remains higher than the sample average of 56%.

Anticipated travel patterns are concentrated along key corridor segments, with Montréal to Québec City identified as the most frequently expected route (3.9 expected annual trips), followed closely by Montréal to Ottawa-Gatineau (3.7 expected annual trips) and Ottawa-Gatineau to Montréal (3.1 expected annual trips). Despite their higher overall travel frequency, stated willingness to pay is comparatively moderate, averaging $21 per 100 km which is third-highest among clusters. This translates to approximately $58 for their primary route, $53 for their secondary, and $53 for their tertiary.

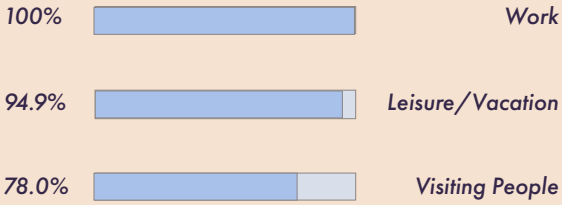
Work-Oriented Travellers

High-income, car-oriented corridor travellers who are willing to convert to the line to use it to travel to work or school

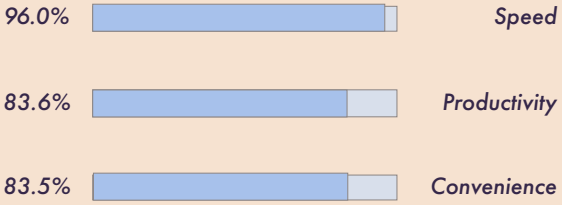
20% ***of Sample***

40%	**1.7**	**19%**	**$21 / 100km**
High-Income *(2nd-Most)*	*Telework Days/Week* *(2nd-Most)*	*Students* *(Most)*	*Willing To Pay* *(3rd Highest)*

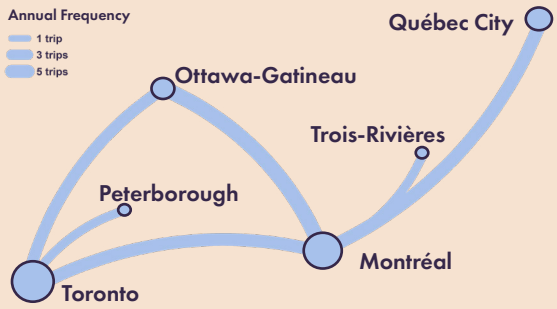
What they will use it for:



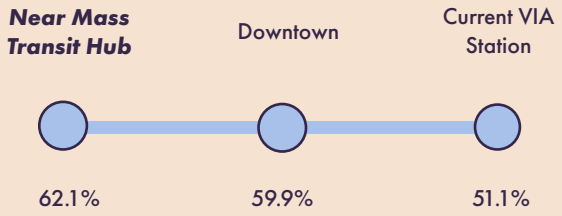
Why they will use it:



Expected Annual HSR Trips



Station Preferences



4 percentage points *above sample for downtown station preference*

Top Routes

	Suggested Price
1. Montréal - Québec City	**$58**
2. Montréal -Ottawa-Gatineau	**$53**
3. Ottawa-Gatineau - Montréal	**$53**

Unique Characteristics:

- *Nearly a quarter (24%) would use for school*
- *68% use rideshare*
- *70% have had good HSR experience abroad*

Policy Considerations

- *Adopt French & Japanese HSR consistency &* **punctuality standards**
- **Workspace upgrades** *for telework travellers to improve productivity*
- **Less waiting** *during the check in process to improve convenience*
- **High-capacity rideshare pickup zones** *to facilitate transit to final destinations*

Figure 4. *Cluster profile for Work-Oriented Travellers*

Highly-Concerned Skeptics

The Highly-Concerned Skeptics cluster comprises approximately one tenth of the sample (9%) and is defined by elevated concern across all aspects of the ALTO project (Figure 3). Relative to other clusters, this group expressed the most concern across every metric that was measured, pointing to a consistently pessimistic outlook regarding the delivery of the project. This concern emerges most notably for cost overruns, of which 75% of the cluster is either moderately or extremely concerned.

From a sociodemographic perspective, this cluster has the largest concentration of retired individuals (36%) among any cluster along with the highest proportion of individuals aged 65+ (34%). These characteristics point to a group that requires transparency through all phases of the project.

When looking at HSR travel, this group is oriented primarily towards leisure and vacation travel, but they show comparatively less interest in other travel purposes. Speed remains the primary motivator for adoption (86%) on par with other clusters. However, while convenience is their second-biggest motivator, it matters less to them than the secondary motivator for any other cluster. This group has ample curiosity surrounding the line, evidenced by the 63% of members that say they would try it just to try it.

Station preferences for this group are bunched, but current VIA stations received the most support (52% approval) followed by stations near a mass transit hub (47%) and downtown stations (43%). The 43% approval for a downtown station was the lowest degree of support for the location.

The top anticipated travel route for this cluster is Ottawa-Gatineau to Toronto, with an average of 2.6 weighted annual trips, followed closely by Montréal to Toronto (2.5 trips) and Toronto to Montréal (2.3 trips). This group has the second-lowest average willingness to pay at $19 per 100km. Along their preferred routes, this equates to roughly $75 for their top route, $94 for their secondary choice, and $92 for their tertiary choice.

Car-Oriented HSR-Experienced

The Car-Oriented HSR-Experienced cluster is the largest cluster in the analysis, making up roughly 28% of the sample, and is defined by strong car use despite universal prior experience with HSR (Figure 3). Every single respondent has used HSR abroad in the past, making this group particularly experienced with the mode. Their experience has come primarily from France and Japan (59% chance their last trip was in one of these two countries), indicating an expectation for reliability and punctuality in the new Canadian system. 84% indicated that they would use Canadian HSR due to a positive experience with HSR abroad, suggesting that they can be attracted by favourable conditions.
This cluster is primarily characterized by their car use both for local and corridor trips. Their 79% car share for corridor trips is the second-highest among clusters. Further, they have the third-highest proportion of local trips made by car (39%) and the second-highest proportion of local trips made by transit (43%).

When asked about what would motivate them to use the line, almost 87% said they would use it because they had a positive experience with HSR in the past. Since every respondent in this

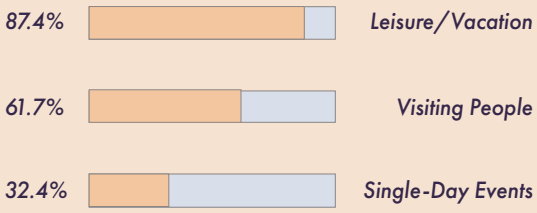
Highly-Concerned Skeptics

Highly risk-sensitive users whose adoption of HSR depends on trust in reliability, pricing flexiblility, ease of use, and project delivery

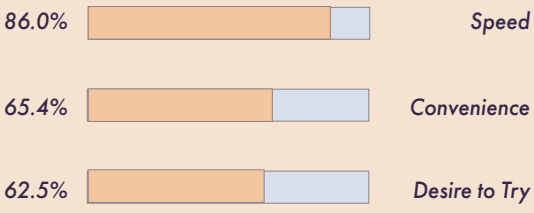
9%
of Sample

40%	**36%**	**75%**	**$19 / 100km**
Low-Income *(Most)*	*Retired* *(Most)*	*Concerned: Costs* *(Most)*	*Willing To Pay* *(2nd-Lowest)*

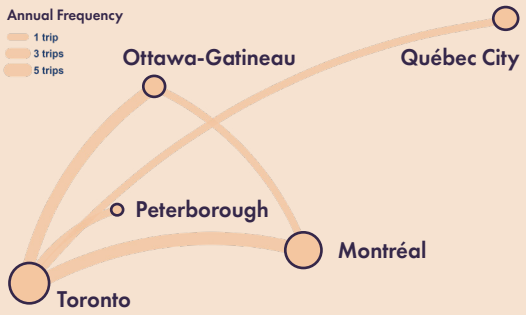
What they will use it for:



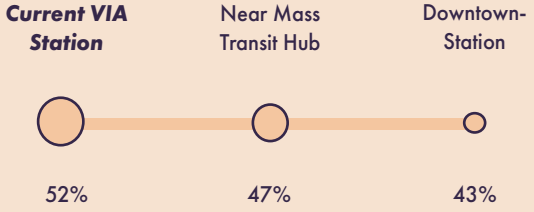
Why they will use it:



Expected Annual HSR Trips



Station Preferences



*13 **percentage points** below sample for downtown station preference*

Top Routes

	Suggested Price
1. Ottawa-Gatineau - Toronto	**$75**
2. Montréal - Toronto	**$94**
3. Toronto - Montréal	**$92**

Unique Characteristics:

- *Highest concern across every metric*
- *2nd highest % of local trips by car (39%)*
- *Highest proportion of seniors 65+ (33%)*

Policy Considerations

- **Transparent cost and progress** *reporting*
- **Flexible booking** *with free or cheap changes & easy cancellations*
- *Dedicated on-site staff to* **assist first-time users** *with navigation and ticketing*
- **Secure and easily navigable** *park and ride lots for drivers*
- *Adopt French & Japanese HSR consistency &* **punctuality standards**

Figure 5. Cluster profile for Highly-Concerned Skeptics

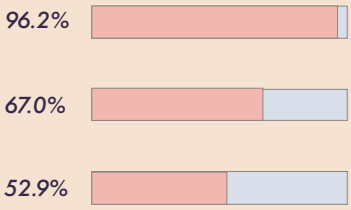
Car-Oriented HSR-Experienced Travellers

Car-oriented leisure-based travellers with prior HSR experience who will benchmark it against driving and expect reliability, comfort, and proper scheduling for events

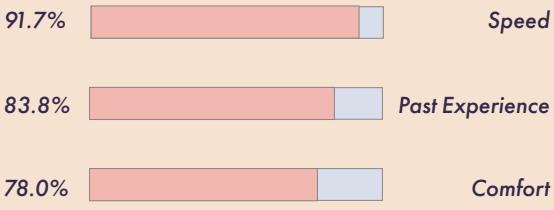
28% *of Sample*

100%	**79%**	**0%**	**$21 / 100km**
Have Used HSR	*Car for Corridor Trips*	*Would Use For Work*	*Willing To Pay*
(Only Cluster)	*(2nd-Most)*	*(Least)*	*(3rd-Highest)*

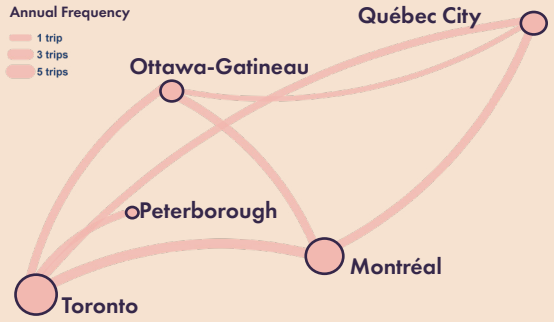
What they will use it for:



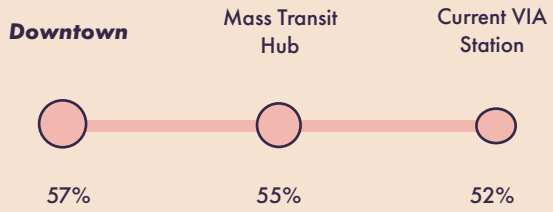
Why they will use it:



Expected Annual HSR Trips



Station Preferences



***1 percentage point** above sample for downtown station preference*

Top Routes

	Suggested Price
1. Toronto - Montréal	**$103**
2. Montréal - Québec City	**$60**
3. Toronto - Ottawa-Gatineau	**$64**

Unique Characteristics:

- *2nd highest share of active local trips (43%)*
- *Lowest share of local PT trips (15%)*
- *Nobody in cluster intends to use line for work*

Policy Considerations

- *Adopt French & Japanese HSR consistency &* **punctuality standards**
- **Secure and easily navigable** *park and ride lots for drivers*
- **Flexible pricing & booking policies** *to compete with rising driving costs*
- **High-frequencies** *for events to capture large entertainment crowds*

Figure 6. *Cluster profile for Car-Oriented HSR-Experienced Travellers*

cluster has used HSR previously, replicating positive experiences becomes a critical policy avenue for this group. Despite their previous experience with HSR, not a single member of this cluster indicated a desire to use the line for work.

Their primary intended travel purpose is leisure and vacations, but this cluster is also interested in using the line for visiting friends and family (67% say they would and over half of the cluster (53%) says they would use it for single-day event travel. This cluster does not have particularly strong opinions about where the station should be located but generally prefers a station near downtown (57% approval). A station near a mass transit hub follows closely behind (55% approval), followed by the current VIA station (52% approval). Their station preferences are somewhat surprising given their propensity for car use and limited transit use.

Similar to the first cluster, their top anticipated travel patterns fall along key routes within the corridor. This group is willing to pay on average $21 per 100km, which is firmly in the middle of pricing suggestions. They expect to frequent the Toronto - Montréal route the most (1.7 weighted annual trips) and think the route should cost $103 on average. There is a drop-off when moving to their second (Montréal to Québec City) and third (Toronto to Ottawa-Gatineau) route options, where they expect to each take an average of 1.2 trips. For these routes, they suggest prices of $60 and $64 respectively.

Rail-Oriented Travellers

The Rail-Oriented Travellers cluster makes up approximately 16% of the sample and is defined by the highest propensity for rail travel across both local and corridor trips (Figure 3). They are the most likely to take trains along the corridor (71% of trips) and the cluster analysis demonstrates their strong alignment with rail-based travel. This cluster also has the highest proportion of local trips by active modes (47%) and transit (33%), while being the least likely to have access to a private car (41%) and the least likely to use one for corridor trips (19%).

From a socio-demographic perspective, this group has the highest incidence of women (61%), the highest proportion of respondents aged 18–35 (43%), and is the second-least likely cluster to have children (15% have children). This reflects a cluster dominated by younger adults.

Unlike other clusters, this group shows stronger engagement with non-leisure travel purposes. Approximately 41% intend to use the line for work and 14% intend to use the line for school travel, the second-highest degree of interest for school travel. They also have relatively high confidence in the system and are most likely to use it for speed, comfort, and convenience. This group has the most support for a station located in the same location as the current VIA station (70% support), suggesting a preference for maintaining existing travel patterns. Both downtown and major transit hub locations also receive majority support.

Their top anticipated routes include Ottawa-Gatineau to Toronto (2.9 expected trips), Montréal to Toronto (2.3 expected trips), along with Toronto to Montréal (2.0 expected trips). This cluster suggests higher pricing than most other clusters, averaging $23 per 100km, with suggested prices of $74, $94, and $92 on their top-three expected routes respectively.

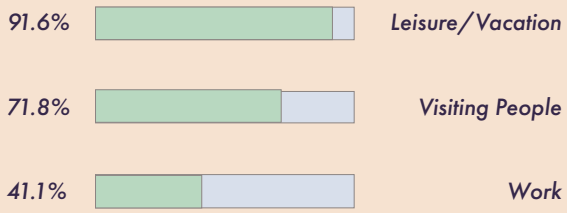
Rail-Oriented Travellers

Highly transit-integrated users whose HSR adoption depends on strong first- and last-mile connectivity, pedestrian accessibility, and flexible booking policies

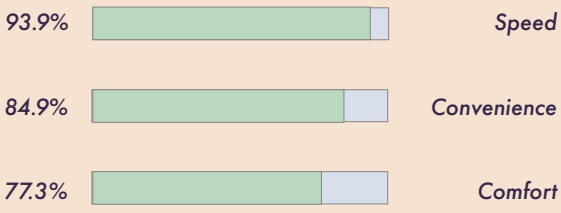
16% of Sample

61%	71%	43%	$23/100km
Women (Highest)	Intercity Train Share (Highest)	18-35 Years Old (Highest)	Willing To Pay (2nd Highest)

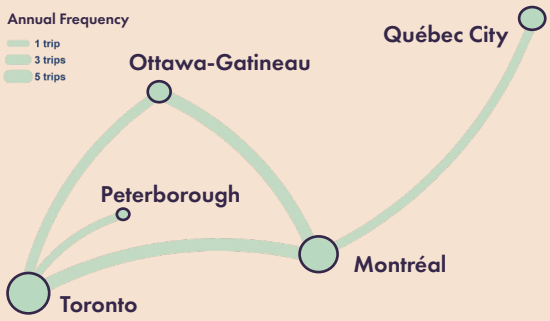
What they will use it for:



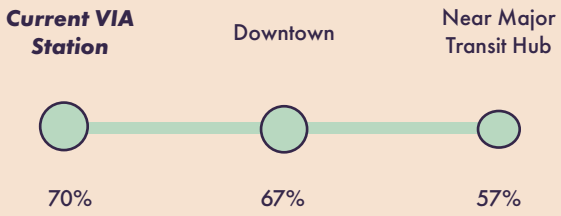
Why they will use it:



Expected Annual HSR Trips



Station Preferences



*11 **percentage points** above sample for downtown station preference*

Top Routes

	Suggested Price
1. Ottawa-Gatineau - Toronto	$74
2. Montréal - Toronto	$94
3. Toronto - Montréal	$92

Unique Characteristics:

- *38% low-income (Below $60k annually)*
- *Highest % of local trips by transit (33%)*
- *Only 41% have access to a private car*

Policy Considerations

- *Create* **new mass/para transit connections** *to stations to encourage transit use*
- *Dedicate* **pedestrian friendly entrances** *for easy access on foot*
- **Gender-informed** *station design for late-night safety*
- **Flexible booking** *with free or cheap changes & easy cancellations*
- *Integrate* **local transit ticketing** *to enhance convenience of last mile transport*

Figure 7. Cluster profile for Rail-Oriented Travellers

Car-Oriented HSR-Inexperienced

The Car-Oriented HSR-Inexperienced cluster makes up roughly 20% of the sample and is defined by strong reliance on car travel combined with no prior experience with HSR (Figure 3). Not a single member of the cluster has ever used HSR, but the group is overwhelmingly curious to try it. Over 75% say they would use the line "just to try it," representing the highest degree of curiosity among clusters.

This cluster is firmly in the car-user group, with 74% having access to one or more cars, the second-highest proportion among clusters. They are the most likely to take their car for local trips (44%) and the least likely to use active modes (32% of trips). They also have the highest share of corridor trips taken by car (81%) and take the VIA train only 5% of the time when travelling within the corridor. From a socio-economic perspective, this group is the second-most likely to have an income below $60,000 (40% are below this threshold).

Similar to other clusters, this group is most likely to use the line for leisure or vacation (95%), followed by visiting friends and family (65%) and single-day travel (53%). They will primarily use the line for its speed advantage, though this cluster also shows the highest interest in using the line for healthcare purposes (8% would use for this purpose). Only one station option gathered majority support, with 59% supporting a location near a mass transit hub while both a station near the current VIA station and a downtown station received 45% approval.

Their top anticipated route is Toronto to Montréal (1.8 expected annual trips), followed by Toronto – Ottawa-Gatineau (1.3 expected annual trips) and Montréal to Québec City (1.3 expected annual trips). This group is willing to pay the least among all clusters, with an average of $18 per 100km. They are willing to pay $81, $63, and $54 for their top-3 routes respectively.

Plane-Oriented Travellers

The Plane-Oriented Travellers cluster makes up approximately 7% of the sample and is defined by a strong reliance on air travel for corridor trips alongside prior experience using HSR (Figure 3). This cluster is ten times more likely than the sample to use air travel, demonstrating a 57% air share along corridor trips.

Locally, this group's travel patterns reflect a balanced approach: 36% of trips taken by car, 42% by active modes, and 22% by transit. When using HSR abroad, they were more likely to use Asian systems than the sample, suggesting familiarity with high-performance rail networks.

This cluster has the highest incomes among all groups, with nearly 61% earning over $120,000 annually. 85% of the cluster is regularly employed (the highest among clusters) and they work an average of 2.1 days per week remotely which is also the highest. Members of this cluster are most likely to be married (60%) and have the second highest likelihood of children (22%). Ride share provisions matter to this group, where 85% of them use services like Uber or Lyft.

While leisure travel remains dominant, 64% say they would use the line for work. Compared to other clusters, they place slightly less emphasis on speed (86% vs. 92% sample average) and greater emphasis on convenience and comfort,

Car-Oriented HSR-Inexperienced Travellers

First-time HSR users anchored in car travel habits, requiring low-friction onboarding and clear value relative to driving

20% **of Sample**

0%	**81%**	**0.8**	**$18/100km**
Have Used HSR	*Corridor Car Share*	*Telework Days/Week*	*Willing To Pay*
(Only Cluster)	*(Highest)*	*(Least)*	*(Lowest)*

What they will use it for:

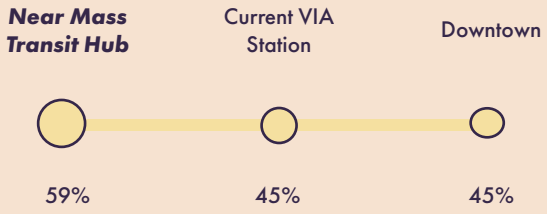
95.2%	*Leisure/Vacation*
65.2%	*Visiting People*
53.1%	*Single-Day Events*

Why they will use it:

92.4%	*Speed*
75.2%	*Desire to Try*
72.0%	*Convenience*

Expected Annual HSR Trips

Station Preferences



11 percentage points below sample for downtown station preference

Top Routes

	Suggested Price
1. Toronto - Montréal	**$81**
2. Toronto - Ottawa-Gatineau	**$63**
3. Montréal - Québec City	**$54**

Unique Characteristics:

- *40% below $60k annual income (2nd most)*
- *Nobody in cluster intends to use line for work*
- *44% of local trips by car (highest)*

Policy Considerations

- **Flexible pricing & booking policies** *to compete with rising driving costs*
- *Easily* **navigable pickup/dropoff** *zones*
- **High-frequencies** *for events to capture large entertainment event goers*
- *Dedicated on-site staff to* **assist first-time users** *with navigation and ticketing*

Figure 8. Cluster profile for Car-Oriented HSR-Inexperienced Travellers

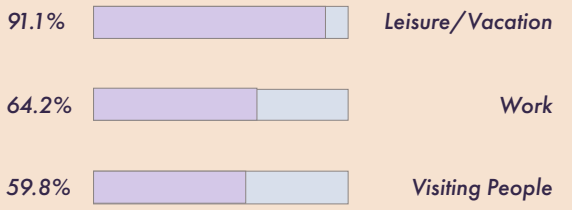
Plane-Oriented Travellers

Air-oriented travellers evaluating HSR as a substitute for short-haul flights, prioritizing speed, convenience, and schedule reliability for frequent and time-sensitive trips

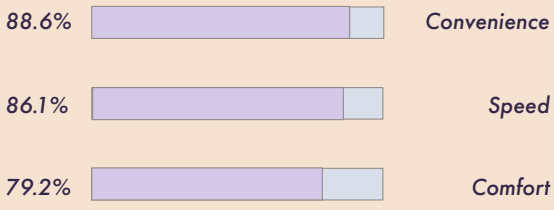
7%
of Sample

60.6%	**2.1**	**57%**	**$23/ 100km**
High-Income	*Telework Days/Week*	*Corridor Plane Share*	*Willing To Pay*
(Highest)	*(Most)*	*(Highest)*	*(Highest)*

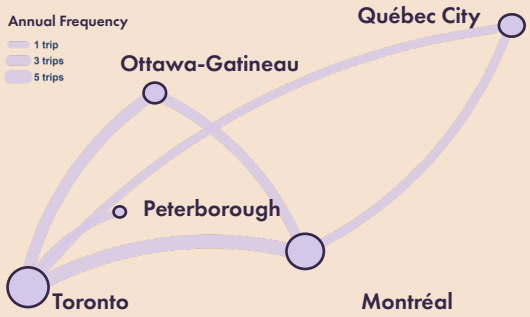
What they will use it for:



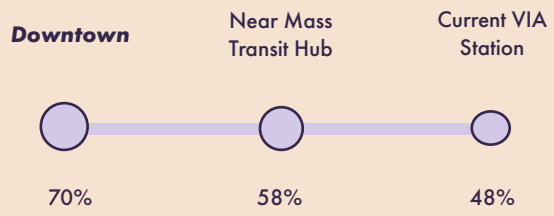
Why they will use it:



Expected Average Member Trips



Station Preferences



***14 percentage points** above sample for downtown station preference*

Top Routes

	Suggested Price
1. Toronto - Montréal	**$119**
2. Toronto - Ottawa-Gatineau	**$91**
3. Montréal - Toronto	**$95**

Unique Characteristics:

- *Most likely to be married (60%)*
- *Highest % of workers (85%)*
- *85% use rideshare (highest)*

Policy Considerations

- **Adopt Japanese HSR punctuality standards** *to encourage travelling for work*
- **Less waiting** *during the check in process to improve convenience*
- **Reduce train slowdown** *areas to maintain speed advantage over short-haul air*
- **Workspace upgrades** *for telework travellers to improve productivity*
- **High comfort seating class** *with privacy for high-income travellers*

Figure 9. *Cluster profile for Plane-Oriented Travellers*

suggesting that ease of travel is a key driver.

Station preferences favour central and well-connected locations, with 70% supporting downtown stations and 58% supporting transit hubs. The most anticipated route is Toronto to Montréal (4.0 expected annual trips), followed by Toronto to Ottawa-Gatineau (3.1 expected annual trips) and Montréal to Toronto (2.0 expected annual trips). This cluster has the highest willingness to pay at $23 per 100km, which is reflected through their suggested prices for their top-three expected routes ($119, $91, $95 respectively).

Figure 10. *ALTO train rendering in rural corridor context. Source: The Millstone.*

Figure 11. *Conceptual rendering of ALTO high-speed rail infrastructure. Source: ALTO.*

5. Discussion & Conclusion

5.1. Cluster-Based Strategy Overview

The market segmentation highlights the wide range of attitudes, needs, and preferences shaping potential HSR demand in Canada (Figure 12). Rather than a single policy approach, the results point to a set of targeted strategies tailored to each segment. This subsection provides a high-level overview of the most important policy priorities for each cluster, with subsequent sections offering more detailed and actionable recommendations.

The Work-Oriented Travellers cluster is defined by a desire to use the line for work, making convenience and productivity their primary concerns. To capture this group, ALTO should prioritize high consistency and punctuality standards as seen in France & Japan, create adequate workspaces for productivity-focused travellers, ensure a quick and convenient check-in process, and create high-capacity rideshare pickup zones to facilitate transit to final destinations.

For the Highly-Concerned Skeptics cluster, elevated concern for the project, older age, and income restrictions define their needs. Policies that emphasize transparency during construction and operation, along with visible reliability measures such as punctuality guarantees will be critical for assuring skeptics. In addition, flexible booking with free or cheap changes/cancellations and dedicated on site staff for new users will encourage those that have not used HSR to try it. To ensure that older drivers can access the station easily, secure and easily navigable parking lots should be created around stations where drivers are comfortable leaving their cars during HSR trips.

The Car-Oriented HSR-Experienced cluster is primarily influenced by prior positive experiences with HSR abroad. Attracting this group will depend on ALTO's ability to replicate high standards of reliability and service quality. Pricing must remain competitive with driving, while flexible booking and change options can further encourage adoption. Given their reliance on cars, park-and-ride access will also be important, particularly for larger households. To capture this group's interest in travel for single-day events, it will be important to schedule additional capacity around major entertainment events.

The Rail-Oriented Travellers cluster is strongly aligned with rail and transit use, making accessibility the primary concern. Policies should focus on strengthening connections to local transit networks, improving pedestrian and cycling access to stations, ensuring station designs promote safety for all users, and maintaining seamless fare integration. These users are also more likely to benefit from service features that support frequent and flexible travel.

The Car-Oriented HSR-Inexperienced cluster is defined by heavy car use and limited exposure to HSR, but also by a high level of curiosity. To capture this group, ALTO should provide accessible and secure park-and-ride facilities, pricing that competes with driving costs, and a seamless onboarding process supported by staff

**One colour per cluster. Empty cell = not a priority*

Figure 12. *Priority policy areas per cluster*

assistance for first-time users. Increasing service frequency during major events may also help attract occasional users and encourage trial adoption.

Finally, the Plane-Oriented Travellers cluster will compare HSR directly with air travel, particularly for work-related trips. For this group, policies should focus on reliability, punctuality, and the ability to work productively while traveling. This includes high-quality onboard workspaces, reliable internet connectivity, and premium seating options that offer comfort and privacy. Minimizing check-in times and maintaining consistent service performance will be essential to capturing and retaining these users.

Taken together, these findings reinforce that no single policy approach will be sufficient to maximize ridership. Instead, ALTO must adopt a combination of targeted strategies that address the distinct needs of each segment while maintaining a consistent and reliable system overall.

5.2. Pricing & Ticketing Strategies

Pricing strategy is a critical policy lever across almost all segments, but the role it plays varies significantly depending on user characteristics and constraints. Differences in willingness to pay across clusters from $18 per 100 km for the Car-Oriented HSR-Inexperienced group to $23 per

100 km for the Plane-Oriented Travellers group highlight the need for a flexible pricing structure that can accommodate both price-sensitive and premium users.

For the Rail-Oriented Travellers, the Car-Oriented HSR-Inexperienced Travellers, and the Highly-Concerned Skeptics, pricing must address both financial and schedule constraints. These segments demonstrate limited spending power, suggesting that rigid or punitive fare structures may discourage adoption. ALTO should therefore adopt flexible booking systems that minimize penalties for cancellations and rescheduling. In Italy, the operator Italo offers different flexibility classes of tickets; for example, the "Flex Fare" allows refunds of up to 80% and provides passengers with a one-hour window to board the next available train if they miss their departure (Italo). Even lower-tier fares allow unlimited changes up to minutes before departure for a modest fee. Adopting similar structures would reduce perceived risk for infrequent or hesitant travellers.

Period-based pricing is another important mechanism for improving accessibility. Fares should become more affordable the further a departure is from peak periods, allowing financially constrained users to adjust their travel behaviour accordingly. This is formalized on the Shinkansen system in Japan, which categorizes service into peak, super peak, regular, and off-peak periods (Milner, 2023). Such a system provides transparency and predictability while encouraging demand to shift toward underutilized time slots.

For both the Car-Oriented HSR-Experienced and Inexperienced segments, pricing must compete directly with the perceived cost and convenience of driving. These users exhibit low-moderate willingness to pay ($18–$21 per 100 km) but currently rely heavily on private vehicles. Pricing strategies could therefore respond to broader travel conditions, such as periods of high congestion on the 401 or sustained increases in fuel prices or taxes, to make HSR a more attractive alternative. While real-time pricing tied directly to driving costs is not currently standard practice, incorporating elements of demand-responsive pricing that reflect broader travel conditions could position HSR as a competitive substitute during high-cost or high-delay periods for drivers.

At the upper end of the market, the Plane-Oriented and Work-Oriented clusters demonstrate higher willingness to pay ($21–$23 per 100 km) and are less price-sensitive. For these users, pricing strategies can focus on service quality and convenience rather than affordability alone. Tiered pricing structures that offer enhanced comfort, flexibility, or time savings may be particularly effective in capturing this segment.
Overall, a pricing strategy that combines flexible ticketing, transparent time-based pricing, and demand-responsive adjustments will allow ALTO to accommodate a diverse range of users while maximizing ridership and revenue across the corridor.

5.3. Station Access Strategies

Station access is one of the most universal requirements across all clusters, though the form it takes varies significantly depending on travel behaviour and modal preferences. Broadly, transit-oriented users, car-dependent users, and mixed-mode users each require different access strategies, making it essential for ALTO to adopt a multimodal approach to station design.

The most consistent need across clusters is integrated local ticketing. Providing transit access at both the origin and destination as part of the

HSR fare would allow users to seamlessly chain trips without needing to navigate unfamiliar fare systems. This is implemented in Germany through Deutsche Bahn's "City Ticket," which includes local transit access in over 130 cities for long-distance passengers (Deutsche Bahn). For transit-dependent clusters, such as the Rail-Oriented Travellers, integrated ticketing reduces friction in the travel experience and encourages the use of public transit over private vehicles.

Closely related to integrated ticketing is the need for seamless physical transfers between HSR and local transit systems. This includes minimizing walking distances between platforms, providing clear signage and wayfinding, and ensuring that station infrastructure can handle large passenger volumes during peak arrival periods. These features are particularly important for users who rely on transit connections or are unfamiliar with the local network, as they reduce uncertainty, stress, and improve the overall reliability of the trip chain.

For transit- and active-mode users, high-quality pedestrian and cycling access is essential. This is especially relevant for the Rail-Oriented cluster, which has the highest shares of active and transit travel, as well as a higher proportion of reported disabilities. Designing stations that are safe, accessible, and easy to navigate on foot or arrive at by bike will not only improve accessibility but also reduce pressure on surrounding road networks. This approach is reflected in many European station environments, such as Gare de Lyon in Paris and Valencia Estació del Nord, where strong pedestrian integration and high-quality public realm design support seamless access on foot and by transit.

At the same time, car access remains important for a significant portion of users, particularly the Car-Oriented HSR-Experienced, Car-Oriented HSR-Inexperienced, and Highly-Concerned Skeptics clusters. For these groups, park-and-ride facilities and efficient pickup and drop-off areas are critical components of station access. While this is less relevant in dense downtown locations, providing secure and well-managed parking at peripheral stations can encourage drivers to shift from full car trips to multimodal journeys that incorporate HSR. Ensuring that these facilities are safe and easy to use will be important for attracting and retaining these users.

The Taichung HSR Station in Taiwan gives an idea of how parking could be integrated, large multi-storey lots are placed directly adjacent to the station with direct pedestrian connections and daily charge caps for multi-day travel (Taiwan High Speed Rail, 2023). Following the same theme, efficient pickup and ride share facilities with ample space will be essential for reducing waiting times at destinations, particularly for the clusters who either plan to use the line for work or who regularly use ride share services. The Taichung station addressed these needs by dedicating the ground floor parking to pickups and those waiting to pickup (Taiwan High Speed Rail, 2023). ALTO will need to ensure that these spaces have the capacity to handle increased demand especially surrounding holidays.

Overall, a successful station access strategy must balance the needs of multiple user groups by integrating transit, active, and car-based access. By reducing friction at the first and last mile, ALTO can improve the overall attractiveness of the system and increase the likelihood of sustained ridership across diverse segments.

5.4. Reliability & Punctuality Standards

Reliability is a critical factor for capturing multiple segments of the HSR market, particularly the

Highly-Concerned cluster, which is skeptical of the project's ability to deliver, the Plane- and Work-Oriented clusters, which will rely on strict schedules for work-related travel, and the Car-Oriented HSR-Experienced cluster, which will benchmark the system against high-performing networks they have used in the past. These groups place importance on reliability for different reasons: trust in delivery, time sensitivity, and performance expectations. However, they all require a system that operates consistently and predictably.

Part of the success of HSR systems in countries such as Japan and France can be attributed to their exceptionally high standards of reliability and punctuality. For example, the Shinkansen line in 2025 saw average delays 1.4 minutes, even when factoring in delays from natural disasters (Central Japan Railway Company, 2025). This level of performance is supported by standardized operational procedures designed to minimize disruption (Ning et al., 2010). When delays occur, predefined rescheduling protocols are implemented to reduce cascading impacts, often relying on simple, repeatable solutions that limit operational complexity. This is complemented by highly trained staff and infrastructure designed to mitigate external disruptions, including snow management systems that allow operations to continue in adverse weather conditions.

ALTO can draw directly from these practices in the design of its system. As part of the planning process, ALTO should identify common sources of delay and establish standardized response protocols that can be deployed quickly and consistently. Staff across all operational roles should be trained to a high standard, with clear procedures for handling disruptions. Contingency planning should include the ability to deploy backup trainsets in the event of breakdowns, ensuring that service continuity is maintained. Given the Canadian climate, snow mitigation strategies will be particularly important, especially if the system relies on catenary infrastructure vulnerable to winter conditions.

Beyond delay mitigation, ALTO should establish strict and transparent punctuality standards. While VIA Rail currently offers partial refunds for significant delays defined as 1+ hours (VIA Rail) within the Windsor - Québec City corridor, the dedicated nature of the HSR system allows for more stringent guarantees. While it is standard practice to only begin delay compensation after 60 minutes, long-distance passengers in the European Union are entitled to meals and drinks, accommodation, and transport when necessary for delays starting at 60 minutes when the delay is announced at departure (European Consumer Centre France, 2026). However, on TGV INOUI trains in France, compensation of 25% begins after 30 minutes of delay. In the ALTO context where rider retention is paramount, compensation could begin for delays exceeding 30 minutes, with full refunds issued for delays beyond two hours. These guarantees would serve as a signal of confidence in the system's performance and reduce perceived risk for users.

To attract riders for single-day events, ALTO should adopt proactive scheduling that anticipates demand for popular events such as large concerts or sporting events. This will be particularly important for capturing riders within the Car-Oriented Experienced & Inexperienced groups who show interest in using the line for that purpose. By creating reliable service offerings for large events, ALTO can maximize its chance of becoming the preferred mode of choice for event-goers.

Overall, these reliability measures are particularly important for the Highly-Concerned Skeptics cluster, where strong guarantees may help alleviate skepticism about project delivery.

For the Plane-Oriented cluster, reliability must compete directly with the predictability of air travel schedules, particularly for work-related trips. For the Car-Oriented HSR-Experienced cluster, maintaining high levels of punctuality will be essential to meeting expectations shaped by previous exposure to high-performing systems. Delivering consistent and reliable service will therefore be a key determinant in whether these groups adopt HSR as a substitute for existing travel modes.

5.5. Onboarding & Comfort Strategies

Creating an environment that is easy to navigate and provides a comfortable experience for riders will be critical in attracting choice users who currently prefer other modes, particularly the Car-Oriented HSR-Inexperienced, Plane-Oriented, and Work-Oriented clusters. The Car-Oriented group is curious about trying HSR, but their entrenched driving behaviour means that a poor first experience could discourage future use. The Plane-Oriented group, on the other hand, will directly compare HSR to air travel and will likely return to flying if expectations for comfort and convenience are not met. While the Work-Oriented group still drives a lot for local and corridor trips, their strong intention to use the line for work suggests that they are less likely to be discouraged than the other two groups. Regardless, they will require similar amenities and onboarding strategies to the Plane-Oriented group to facilitate work and school travel.

A seamless onboarding experience is essential for each of these groups. HSR's key advantage in the corridor is speed when compared to car travel and the reduced need for security screening when compared to air travel. Less security allows passengers to arrive closer to departure time and makes the process significantly easier. To preserve this advantage, ALTO should implement a frictionless ticketing and boarding process. This includes a fully integrated, account-based digital ticketing system that enables seamless validation across HSR and local transit networks similar to the system seen in the Japanese Shinkansen system (Central Japan Railway Company, 2025). At the same time, physical ticketing options should remain available, with strategically placed machines and staff assistance for users who require support navigating the system.

Beyond onboarding, comfort and productivity will be key differentiators, particularly for business-oriented travellers. Rail travel offers more space than air travel, allowing for the creation of dedicated work environments. These features will be especially attractive to the Plane-Oriented and Work-Oriented clusters, a large share of whom intend to use the system for work. These upgrades will also benefit other groups such as the Rail-Oriented Travellers cluster, of whom 40% intend to use the line for work. Chinese HSR offers a business class with larger, rotating seats and enhanced privacy, but work travellers still have to use trays not designed for work (China Discovery, 2026; Chinese Trains, 2025). ALTO should therefore provide a range of seating options, including configurations designed for productive work, drawing on examples such as the "S Work P Seats" implemented in Japan (Central Japan Railway Company, 2025). These seats offer features such as larger tray tables, privacy screens between seats, unlimited internet that is faster than other cars, and space where phone calls and virtual meetings are permitted.

For users requiring greater privacy, ALTO could introduce reservable workspaces or business booths designed for meetings or calls, as well as premium seating options that provide additional space and privacy. Reliable onboard internet will be essential for supporting these use cases, particularly given the inconsistent coverage

along parts of the corridor. Ensuring strong and stable connectivity will be critical for creating a productive travel environment.

Finally, extending these principles to station environments can further enhance the user experience. Providing comfortable and functional waiting areas or workspaces within stations can reduce perceived downtime and improve flexibility for travellers, particularly those using HSR for work purposes.

5.6. Transparency & User Safety

Perceived safety and transparency throughout both the construction and operation phases are critical for several segments of the HSR market, particularly the Highly-Concerned and Rail-Oriented clusters. The Highly-Concerned group exhibits elevated concern across all aspects of the project and is more likely to base travel decisions on trust in the system's delivery and operation. The high proportion of women in the Rail-Oriented group means that they likely have greater sensitivity to safety and reliability in transit environments.

Ensuring that stations feel safe and accessible to all users is therefore an important design priority. While transit stations are generally safe due to high passenger volumes, they can become less comfortable for vulnerable users during late-night or low-frequency service periods. To address this, ALTO could incorporate co-design processes with gender-informed planning experts and users with lived experience of safety concerns. Vienna's "gender mainstreaming" program provides a strong precedent, having integrated gender-sensitive planning into over 50 projects and emphasizing design elements such as adequate lighting and clear visibility throughout public spaces (City of Vienna, 2013; City of Vienna, n.d.). Supporting this, research from Cornell University identifies lighting as the most important factor influencing perceived safety, alongside visible security cameras, emergency communication systems, and clear entrance and exit signage (Sudabeh Majd, 2013).

In practice, this suggests that station design should avoid enclosed or poorly visible spaces, such as narrow corridors, tight corners, or areas with inconsistent lighting. Instead, stations should prioritize open layouts, strong sightlines, and well-lit environments. Additional measures such as actively monitored CCTV systems, rapid-response help lines, and location-based incident reporting tools can further improve user confidence and contribute to a safer overall experience.

Beyond physical design, transparency in project delivery is essential for addressing broader concerns about the ALTO project. Survey responses indicate significant concern regarding potential delays and cost overruns, particularly among the Highly-Concerned cluster. Given the recent history of large infrastructure projects in Canada, these concerns highlight the importance of maintaining public trust throughout the project lifecycle.

To address this, ALTO should prioritize transparent communication around project timelines, budgets, and performance metrics. Regular public reporting on project progress, including adherence to schedules and cost projections, would help reduce uncertainty. In addition, publishing the rationale behind key decisions—such as those related to environmental mitigation, property acquisition, and station design—would prevent the project from becoming a "black box" and improve public confidence in the process.
Together, these measures address both the physical and perceptual barriers to adoption by improving safety at the station level and trust

in the system more broadly. For clusters that are particularly sensitive to risk and uncertainty, these factors will play an important role in determining whether they choose to adopt HSR as a travel option.

5.7. Conclusion

These findings suggest that market segmentation is a valuable tool for identifying key policy avenues for transit projects, and that large-scale investments should incorporate iterative segmentation analyses as projects move through different phases. The key takeaway from this research is that the Canadian HSR market is heterogeneous and no single policy instrument has the ability to attract all users. Instead, a tailored approach is required based on the individual characteristics and constraints of different market segments. Pricing strategies and station access emerged as the two most cross-cutting policy categories, though even within these domains different segments require unique interventions. Punctuality, convenient onboarding, and seating class differentiation will be important for attracting business users and those skeptical about HSR. Less cross-cutting but more targeted policy priorities include transparency throughout the process and safety-focused design, which are critical for building trust in both the system and the decisions being made.

This study is subject to several limitations. Market segmentation based on stated and revealed preference surveys is inherently constrained by recall bias and relies on the accuracy of self-reported behaviour. Individuals do not always act in accordance with their stated intentions, leading to gaps between expected and actual system use. In addition, this research excluded respondents who indicated no intention to use the line. While this allowed for a more focused analysis of potential users, it limits insight into the attitudes and behaviours of those who may resist adoption.

Future research should revisit this analysis as the project evolves and once the line becomes operational. Observing actual travel behaviour will be critical for understanding how attitudes, intentions, and mode choices shift over time. Further analysis of the segments identified in this study would provide deeper insight into long-term adoption patterns and transitions between user groups. As the project continues to develop and face public scrutiny, generating evidence that connects user behaviour to policy design will be essential for ensuring that HSR delivers lasting economic and modal shift benefits in Canada. This project strengthens the empirical profile of market segmentation analyses and provides additional precedent of the method being used in a high-speed rail context, among the first of its kind in North America. Further, this study underscores the need for granular user data for planning projects and highlights how data aggregation can obscure individual attitudes and preferences.

Figure 13. *Depiction of ALTO boarding. Source: ALTO*

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Appendix

Appendix A.

Appendix A reproduces the English-language version of the Canadian High-Speed Rail Survey.

TRAM

Canadian High-Speed Rail Survey

TRAM – Transportation Research at McGill

A. Section A. Getting Started

A.1. Email Address (optional – prize draw entry)

If you would like to be entered in the prize draw once you complete this survey, please provide a valid email address where we can reach you.

If you choose not to provide a valid email address, you will not be eligible to win a prize.

A.2. What year were you born?

- 2007
- 2006
- ...
- 1925
- 1924

A.3. In which of the following regions do you currently live?

- Greater Toronto
- Peterborough
- Ottawa-Gatineau
- Montréal Region
- Trois-Rivières
- Québec City

A.4. What is your current employment status?

- Work full-time
- Work part-time
- Student
- Homemaker
- Retired and not working
- Not employed and looking for work
- Not employed and not looking for work
- Other:

A.5. Do you have a primary work location (including your home if you work from home)?

**Select No if your workspace is on-the-go (e.g., delivery drivers, taxi drivers, field service workers, etc.)*

- Yes
- No

A.6. Over the last seven days, how many days did you telework?

Teleworking means working from a remote location such as home or a café instead of commuting.

- Never
- 1 day
- 2 days
- 3 days
- 4 days
- 5 days
- 6 days
- 7 days

A.7. Where is your current primary work location?

- Greater Toronto
- Peterborough
- Ottawa-Gatineau
- Montréal Region
- Trois-Rivières
- Québec City
- Other

B. Section B. General Travel

B.1. In the last 7 days, which of the following transport modes have you used at least once?

Check all that apply.

- Car
- Cycling
- Walking
- Public transit
- I didn't travel in the last 7 days
- Other:

B.2. In the last 7 days, how many round trips did you make with the following modes to any destination?

For example: going from home to work and returning = one round trip. If you used a mode more than 10 times, please indicate 10 (the maximum value).

	Number of round trips
Car	
Cycling	
Walking	
Public Transit	

B.3. Please rate your agreement with the following statements:

	Disagree	Agree
I consider myself a transit user		
I consider myself a car user		
I consider myself a cyclist		
I consider myself a pedestrian		

C. Section C: Previous High-Speed Rail (HSR) Experience

The following questions are about your previous experience with HSR in a global context.

C.1. Have you heard about the proposed Toronto–Québec City HSR project?

- Yes
- No

Background: *In February 2025, the Government of Canada announced it is developing a high-speed rail (HSR) network spanning approximately 1,000 km along the Toronto–Québec City corridor. The service, officially named "Alto", has planned stops in Toronto, Peterborough, Ottawa-Gatineau, Montréal, Laval, Trois-Rivières, and Québec City. With estimated speeds of up to 300 km/h, travel time from Montréal to Toronto is expected to be cut to approximately three hours.*

C.2. Have you ever previously used HSR (300 km/h+) in another country?

- Yes
- No

C.3. Did your most recent HSR trip start and end in the same country?

- Yes
- No

C.4. In which country did your most recent HSR trip occur?

C.5. Where did your most recent HSR trip originate from?

C.6. Where did your most recent HSR trip end?

C.7. When was your most recent HSR trip?

- 2025
- 2024

- 2023
- 2022
- 2021
- 2020
- 2019
- 2018
- 2017
- 2016 or before

C.8. Regarding your most recent HSR trip, please rate your agreement with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Overall, I was satisfied with my last experience with HSR					
I would like to see Canada build a similar HSR					

C.9. Is there anything else you would like to share about your most recent HSR experience?

D. Section D: Benefits and Concerns of High-Speed Rail (HSR) in Canada

D.1. Regarding the Toronto–Québec City HSR project, please rate your agreement with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The HSR project is good for the Canadian economy					
The HSR project is good for Canadian tourism					
The HSR project is good for the environment					
The HSR project is good for Canada's international image					
The HSR project is good for my region's growth					

D.2. Regarding the Toronto–Québec City HSR project construction, please rate your level of concern:

	Not at all concerned	Slightly concerned	Somewhat concerned	Moderately concerned	Extremely concerned
The noise impacts of the HSR during construction					
The impact of the HSR on natural habitats during construction					
The HSR's impact on air pollution levels during construction					
Cost overruns during construction of the HSR					
Construction delays affecting the start of operation of the HSR					
The land acquisition required for the HSR					

D.3. Regarding the Toronto–Québec City HSR project operation, please rate your level of concern:

	Not at all concerned	Slightly concerned	Somewhat concerned	Moderately concerned	Extremely concerned
The noise impacts of the HSR during operation					
The impact of the HSR on natural habitats during operation					
The effects of vibration from the HSR on nearby buildings and residents					

E. Section E: Recent Travel within Canada

E.1. Which of the following regions have you visited in the previous 12 months?

Please choose all that apply.

- Greater Toronto
- Peterborough
- Ottawa-Gatineau
- Montréal Region
- Trois-Rivières
- Québec City
- None of the above

E.2. In the previous 12 months, how many times have you travelled from your region to each of the following? Please indicate 0 if you have not used the listed mode; indicate 10 if you have used a mode more than 10 times.

	Car	Plane	Train	Bus	Other
Ottawa-Gatineau					
Greater Toronto					
Peterborough					
Montréal Region					
Trois-Rivières					
Québec City					

F. Section F: Most Recent Trip within Canada

The following questions refer to your single most recent trip within the corridor.

F.1. From the list of regions you have visited in the previous 12 months, which was the most recent region you travelled to?

- Greater Toronto
- Peterborough
- Ottawa-Gatineau
- Montréal Region
- Trois-Rivières
- Québec City

F.2. What mode of transport did you use for your most recent trip?

- Car
- Plane
- Train
- Bus
- Other:

F.3. When did your most recent trip take place?

- November 2025
- October 2025
- September 2025
- August 2025
- July 2025
- June 2025

- May 2025
- April 2025
- March 2025
- February 2025
- January 2025
- December 2024
- November 2024

F.4. How many people accompanied you on your most recent trip?

- None
- 1
- 2
- 3
- 4
- 5 or more

F.5. How many adults accompanied you on your most recent trip?

- None
- 1
- 2
- 3
- 4
- 5 or more

F.6. What was your door-to-door travel time for your most recent trip?

- 1:00
- 1:30
- …
- 11:30
- 12:00

F.7. What was the primary purpose of your most recent trip?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

F.8. What time did you leave your region for your most recent trip?

- 12:00 AM
- 12:30 AM
- …
- 11:00 PM
- 11:30 PM

F.9. Regarding your most recent trip, please rate your agreement with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Overall, I was satisfied with my most recent trip					

G. Section G: Anticipated Travel by High-Speed Rail in Canada

The following questions are about the Toronto–Québec City HSR corridor and your travel preferences related to it.

G.1. If HSR service were available today, how frequently would you travel to each of the following regions?

	Daily	Weekly	Monthly	6–9 times a year	4–5 times a year	A few times a year	Rarely / Never
Greater Toronto							
Peterborough							
Ottawa-Gatineau							
Montréal Region							
Trois-Rivières							
Québec City							

G.2. For what reasons do you plan on using HSR in Canada in the future?

Check all that apply.

- Travel time would be shorter than other modes
- It will be more convenient than other modes
- It will be more comfortable than other modes
- It will allow me to use the travel time more productively
- It will be well connected to local transit
- I would like to try it out
- I had good experiences with HSR in other countries
- Other:

G.3. For what reasons do you not plan on using HSR in Canada in the future?

Check all that apply.

- Travel time would be longer than other modes
- It will be less convenient than other modes
- It will be less comfortable than other modes

- It will be poorly connected to local transit
- It will be too expensive when I travel with others
- I had bad experiences with HSR in other countries
- I do not trust the technology
- I am not planning to travel to these destinations
- It is too far in the future to decide
- Other:

G.4. Where should the HSR station be located in your region?

- Downtown
- Near a major transit hub
- Near the airport
- Away from downtown, in an area well-served by public transit
- Away from downtown, in a car-accessible area (e.g., near highways or park-and-ride lots)
- At the current VIA station
- Other:

G.5. How much are you willing to pay for a one-way HSR ticket from your region to each of the following regions?

	Ticket price ($CAD, one-way)
Greater Toronto	
Peterborough	
Ottawa-Gatineau	
Montréal Region	
Trois-Rivières	
Québec City	

H. Section H: High-Speed Rail in Canada – Trip Purpose and Party Size

For each destination you indicated you would travel to, please indicate your purpose(s) and expected party size.

H.1. What would be your purpose(s) for using HSR to Greater Toronto?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare

- Other:

H.2. How many people do you expect to travel with you on the HSR to Greater Toronto for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	
Other	

H.3. What would be your purpose(s) for using HSR to Peterborough?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

H.4. How many people do you expect to travel with you on the HSR to Peterborough for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	
Other	

H.5. What would be your purpose(s) for using HSR to Ottawa-Gatineau?

- Work / Business

- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

H.6. How many people do you expect to travel with you on the HSR to Ottawa-Gatineau for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	
Other	

H.7. What would be your purpose(s) for using HSR to Montréal Region?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

H.8. How many people do you expect to travel with you on the HSR to Montréal Region for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	

Other

H.9. What would be your purpose(s) for using HSR to Trois-Rivières?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

H.10. How many people do you expect to travel with you on the HSR to Trois-Rivières for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	
Other	

H.11. What would be your purpose(s) for using HSR to Québec City?

- Work / Business
- Education / School
- Leisure / Tourism
- Single Day Entertainment Event
- Shopping
- Visiting Friends / Family
- Healthcare
- Other:

H.12. How many people do you expect to travel with you on the HSR to Québec City for the following purposes? (If travelling alone, indicate 0; maximum 6.)

	Number of travel companions
Work / Business	
Education / School	
Leisure / Tourism	
Single Day Entertainment Event	
Shopping	
Visiting Friends / Family	
Healthcare	
Other	

H.13. Is there anything else you would like to share about the Toronto–Québec City HSR project?

I. Section I: Your Neighbourhood

These questions will help us understand your neighbourhood.

I.1. To provide us with the approximate location of your primary home, which would you prefer to do?

This will help us better understand the travel behaviour of residents in your region.

- Type my home postal code
- Place a pin on a map

I.2. Please enter your primary home postal code. Please use the format XXX XXX (e.g., H3A 0C2).

I.3. On the following map, please adjust the zoom and drag the pin to your primary home location.

J. Section J: Life and Health

J.1. Do you have a disability or condition, whether temporary or permanent, that limits your mobility?

- Yes
- No

- Prefer not to answer

J.2. Which type of disability or condition do you have?

- Permanent
- Recurring
- Temporary
- Prefer not to answer

J.3. Are your daily transportation needs affected by your condition(s)?

- Yes
- No

J.4. If you wish, please let us know how your daily transportation needs are affected by your condition(s).

K. Section K: Travel Options

K.1. Select all of the following that apply to you:

- I have a driver's license
- I own a bicycle
- I own an e-bike
- I have a car-sharing membership (e.g., Communauto, Leo)
- I have a bicycle-sharing membership/subscription (e.g., BIXI)
- I have used a carpooling service in the past year
- I have used Uber/Lyft in the past year
- None of the above

K.2. How many licensed drivers are in your household, including yourself?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8+

K.3. How many private automobiles do you have regular access to?

Include only those owned, leased or borrowed on a long-term basis by you or someone else in your household and which you are permitted to drive. Do not include car-share such as Communauto or Leo.

- None
- 1

- 2
- 3
- 4
- 5+
- Prefer not to answer

L. Section L: Personal Characteristics

L.1. How do you identify yourself?

- Man
- Woman
- Non-binary or non-conforming
- Prefer not to answer
- Other:

L.2. What is your marital status?

- Single (never married)
- Married (or common law)
- Separated or divorced
- Widowed
- Prefer not to answer

L.3. How many people are in your household, including yourself?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more

L.4. How many adults aged 18 or older live in your household, including yourself?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more

L.5. Are there any children under the age of 18 in your household?

- Yes
- No

L.6. How many children between the age of 6 and 13 (inclusive) live in your household?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more

L.7. How many children under the age of 6 (not including 6 years old) live in your household?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more

L.8. Were you born in Canada?

- Yes
- No
- Prefer not to answer

L.9. When did you move to Canada?

- 2025
- 2024
- ...
- 1924
- 1923

L.10. To which ethnic or cultural group(s) did your ancestors belong?

Check all that apply.

- Aboriginal
- Asian
- Black
- White / Caucasian

- Latin American
- Middle Eastern
- Prefer not to answer
- I don't know
- Other:

L.11. In which country did you spend the most time growing up until you turned 18?

L.12. How would you characterize the environment where you grew up?

- Urban
- Suburban
- Rural

L.13. To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
As a child, I was regularly driven around.					
As a child, I regularly biked.					
As a child, I regularly took public transit.					
As a child, I regularly walked to get to my destinations.					

L.14. Which category best describes your annual household income, taking into account all sources of income?

- Less than $30,000
- $30,000 to $59,999
- $60,000 to $89,999
- $90,000 to $119,999
- $120,000 to $149,999
- $150,000 to $179,999
- $180,000 to $209,999
- $210,000 or more
- I don't know
- I prefer not to answer

L.15. What is your highest level of education obtained?

- Primary/Elementary school diploma
- Secondary school diploma
- Trade/Technical school or college diploma
- Undergraduate degree
- Graduate degree

- Prefer not to answer
- I don't know

M. Section M: Final Thoughts

Thank you for your participation. We would like to ask you a few questions on your willingness to participate further.

M.1. How did you hear about the HSR Survey?

- Facebook / Instagram
- TikTok
- Flyer
- Website
- From Employer
- Other:

M.2. Would you be interested in participating further in this research through additional surveys or interviews conducted by our research team in the future?

- Yes
- No

M.3. If you have not done so already, please provide us with a valid email address so that we can contact you for participation in other components of this research project:

M.4. Do you have any final thoughts about HSR in your region?

Thank you for completing the survey!

If you have any questions or concerns, please email tram.urbanplanning@mcgill.ca