

Light Rail Transit in the Region of Waterloo: A qualitative examination of urban rail's
effects on real estate, development and urban identities

by
Justin Cook

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Arts
in
Planning

Waterloo, Ontario, Canada, 2018

© Justin Cook 2018

Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

The contents of this thesis were primarily authored by Justin Cook. Dr. Jennifer Dean and Dr. Dawn Parker contributed to content creation and editing in both Chapter 4: Paper 1: Realtor Perspectives on the Impact of the ION LRT on the Real Estate Market in the Region of Waterloo and Chapter 5: Paper 2: The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada. Yu Huang also contributed content and editing in Chapter 5: Paper 2: The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada.

Abstract

Transit oriented development has become a staple of contemporary planning practice that is applied in cities throughout the world to help guide the development of sustainable, economic, and social outcomes in urban regions. Widely perceived as a response to automobile centric and urban sprawl inducing design principals of post war planning approaches, transit oriented development is offered as a means of achieving compact urban form that negates many of the issues associated with sprawl. While considerable effort has been undertaken to examine the extent to which transit oriented development affects change on surrounding urban environments, few studies exist that have investigated how social processes interact with transit oriented development to produce the observed effects.

This research uncovers underlying social dynamics and perspectives that shape the potential effectiveness of transit oriented development to restructure Canadian real estate markets, urban and economic development trends, and resident behaviour. A case study of the ION light rail transit project in the Region of Waterloo, Ontario, examines how and why resident perspectives and social dynamics are emerging because of the project and subsequently affecting the Region's development patterns. Focus groups with real estate agents are presented as the primary data of the thesis, which depict the project as a mechanism for attracting creative class economic development and new residents, resulting in an urban landscape divided between automobile and transit centric communities and lifestyles. Findings show the need to increase the use of qualitative methods in transit oriented development research, as they carry the potential to uncover and explain associated trends. To address sustainability, economic development, and social equity concerns related to TOD, recommendations to enact policies that can offset gentrification and unaffordability trends, promote increased behaviour change amongst

heterogeneous and automobile centric populations, and to capitalize on homogeneous population preferences are offered.

Acknowledgements

I would like to thank my program advisor Dr. Jennifer Dean for her continued support, advice, and encouragement throughout the process of developing this thesis. I would also like to thank Dr. Dawn Parker for her support and insight as a committee member. Thank you to Yu Huang, Xinyue Pi, and the Urban Growth and Change Research Group for the insights and support they provided in developing this thesis. Thank you to my friends and family for their support during this process, it would not have been possible without you.

I would also like to thank the Kitchener Waterloo Association of Realtors, the Region of Waterloo, City of Waterloo, City of Kitchener, and City of Cambridge for their support in developing my thesis. Thank you to SSHRC for providing funding under the Partnership Development Grant. Lastly, I would like to thank all of the Realtor participants for their time, contributions, and valuable insights.

Table of Contents

Chapter 1: Introduction	1
1.1. Research Question and Objectives	4
1.2. Thesis Outline	5
Chapter 2: Literature Review: Transit Oriented Development	7
2.1. History of TOD	8
2.2. Desired TOD Outcomes	9
2.3. Contemporary Understandings of TOD	15
2.4. Gaps in the Research	17
Chapter 3: Methods	18
3.1. Research Philosophy	18
3.2. Research Approach	18
3.3. Data Collection.....	20
3.4. Ethics and the Role of the Researcher.....	23
3.5. Limitations	24
Chapter 4: Paper 1: Realtor Perspectives on the Impact of the ION LRT on the Real Estate Market in the Region of Waterloo	26
4.1. Executive summary	26
4.2. Findings	27
4.3. Conclusion.....	33

Chapter 5: Paper 2: The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada	34
5.1. Abstract:	35
5.2. Introduction	36
5.3. Land value uplift and transit investment: Areas of clarity and convolution	37
5.4. Research Site: The Region of Waterloo	41
5.5. Research Methods	44
5.6. Results	46
5.7. Discussion	66
5.8. Conclusion.....	72
5.9. References	74
Chapter 6: Discussion and Conclusions: Research Findings and Recommendations.....	81
6.1. Discussion	81
6.2. Future Research Recommendations	84
6.3. Policy Recommendations	86
6.4. Conclusion.....	88
References.....	91
Appendix.....	98

List of Figures

Figure 1 – Map of the Region of Waterloo..... 43

List of abbreviations

Transit Oriented Development - TOD

Region of Waterloo - RoW

Light Rail Transit - LRT

Land Value Uplift - LVU

Chapter 1: Introduction

The continued expansion of urban sprawl, its negative associations with environmental degradation and poor health, growing concerns of global warming, and the economic prosperity of cities and their residents have become central concerns of urban planners (Furberg & Ban, 2012; Georgescu, Morefield, Bierwagen, & Weaver, 2014; Nechyba & Walsh, 2004; Sorensen, 1999). Efforts to address these effects have resulted in the creation of land use planning approaches and policies, such as new urbanism and smart growth, focused on ensuring future development increases urban density and promotes sustainable systems. These efforts have, however, become frustrated by social, political, and economic factors, that have reinforced urban sprawl and limited the ability of planning theory and policy to impact the urban environment and realize the development of more sustainable and healthy cities (Grant, 2009).

Many contemporary planning theories and practitioners posit that these issues are best addressed through the implementation of transit oriented development (TOD), which positions urban rail infrastructure as a central mechanism for sustainable urban development (Belzer & Autler, 2002; Carlton, 2007; Cervero & Sullivan, 2011). Emerging from early new urbanist theories, TOD generally focuses on increasing density and public transit ridership through the development of urban rail station areas. The TOD approach differs from prior new urbanist approaches, as it views density and sustainable outcomes occurring from transit infrastructure, as opposed to the notion that transit becomes viable when sufficient density is achieved (Carlton, 2007).

The success of early TOD projects to increase transit ridership and densities surrounding station areas has resulted in TOD becoming widely used in a variety of urban areas and scales throughout the world. Following this increased adoption of TOD approaches, studies have

increasingly focused their attention on the economic development associated with TOD. Many of these studies have associated TOD with economic growth in urban areas by comparing real estate values found in station area with real estate values found in non-station areas (s, Ferguson, & Kanaroglou, 2014; Higgins & Kanaroglou, 2016a). Additionally, research has been undertaken that examines how urban rail systems affect economic development through employer attraction, which has been specifically associated with creative class employment fields (Florida, 2005; Higgins & Kanaroglou, 2016b; Litman, 2012b). The growing centrality of focus on the economic development impacts of TOD has created concern, however, that many of the benefits of TOD are incurring negative impacts on the equity and affordability of cities (Jones & Ley, 2016; Revington & Townsend, 2016).

Developing a robust understanding of how and why TOD affects urban environments is increasingly important in the Canadian context, as urban rail systems are sought after by municipalities across the country. While a general trend of increased interest in urban rail systems has been observed across Canada, within Ontario, recent provincial policy developments, including the Places to Grow Act and the Growth Plan for the Greater Golden Horseshoe, have identified specific municipalities as growth centers. Density requirements set by these provincial policies aim to focus development and create urban spaces within identified growth centers, which are better suited for infrastructure investment and will allow for future population growth without requiring additional urban sprawl (Government of Ontario, 2005, 2017).

The creation of federal funding resources for urban transit infrastructure projects has led several Ontario communities to undertake TOD projects as a means of encouraging densification (Infrastructure Canada, 2018). While several Canadian cities have taken this opportunity to

extend their existing urban rail systems, the Region of Waterloo's (RoW) approval of the development of the ION LRT in 2012, which is scheduled to begin operation in mid 2019, represents the first initial implementation of a municipal rail transit system in Canada since the implementation of the O-Train in Ottawa in 2001, 18 years ago. As many other Canadian cities are currently considering implementing their own initial urban rail systems, the effects of the ION LRT are likely to be highly informative and influential on their decisions. As such, ensuring that data collection and analysis of the ION LRT project is as high quality and in depth as possible will offer future Canadian urban rail projects the best chances of successfully addressing environmental, sustainability, affordability, and economic development concerns.

To develop a holistic understanding of the ION LRT's impact on the RoW, the Urban Growth and Change Research Group at the University of Waterloo, with which this study is affiliated, has developed a mixed methods research approach. The research presented in this thesis offers a qualitative examination of how the ION LRT is impacting real estate markets, economic development trends, and resident behaviours and perspectives of the Region. The findings inform and complement quantitative research being developed simultaneously by other researchers in the Urban Growth and Change Research Group, while also providing additional insights into the causal social and cultural effects underlying LRT TOD projects.

This study includes two manuscripts developed from data collected using focus groups with real estate agents in the RoW. Each manuscript depicts how the implementation of the ION LRT is understood and is consequently expected to affect urban populations' housing decisions. The first manuscript's examination of the ION LRT's impact on real estate markets in the RoW depicts how the project encouraged growth by developing the Region's image and by enhancing lifestyle amenities in station areas. The second manuscript analyzes focus group data to

investigate variables typically used in hedonic method research. The second manuscript's investigation results offer refinements to existing variables and offer additional variables for consideration for use in future hedonic studies. This thesis analyzes the findings of both manuscripts in the context of TOD to consider how the social and economic dynamics emerging from the ION LRT project reflect, contradict, or provide new insights within the existing body of TOD research. Finally, future research and policy recommendations are offered as a means for improving future TOD studies and urban rail projects, including: placing a greater emphasis on qualitative methods for understanding TOD, which can help to delineate cultural attitudes or multi-market attributes that emerge from place and population relationships, especially those related to urban rail systems; ensuring considerations for low income individuals are maintained throughout the urban rail planning and implementation process; and understanding urban real estate markets enclaving properties, which may offer means of addressing tangential issues.

1.1. Research Question and Objectives

This research was guided by the primary research question: *how and why are real estate decisions affected by the implementation of TOD vis-à-vis an LRT system?* Using expert knowledge of the RoW's real estate market, the research objectives were to: a) explore individual preferences for living near LRT stations or within TODs; b) understand whether and how major transit infrastructure influences regional attractiveness for current or future residents; c) investigate which demographic groups find TOD to be desirable; and d) provide policy and implementation recommendations that can help cities better integrate TOD into urban areas.

1.2. Thesis Outline

1.2.1. Chapter 1: Introduction

The introduction situates the research topic of TOD and its relevance within the research setting of the development of the ION LRT system in the RoW, Ontario. Further, it provides an overview of the research questions that serve as a guide for the research project and outlines the structure of the thesis.

1.2.2. Chapter 2: Literature Review

The literature review investigates how TOD emerged as a concept during the 1980s and 1990s and how it has since emerged as a policy approach for planners. The desirable outcomes that are associated with TOD are discussed as a basis for considering its effect on the urban landscape, and how these effects have subsequently been scrutinized by researchers. The contemporary understandings of TOD are presented, which position its effects as not only questionable in realizing the desired outcomes, but possibly exacerbating the issues TOD proponents purport it is likely to address. Finally, this section concludes with a presentation of gaps in TOD research is, which this thesis sets out to fill.

1.2.3. Chapter 3: Methods

The Methods chapter provides an overview of how the researcher's constructivist epistemology informed the thesis' qualitative methodological approach. The case study approach used in this thesis, examining how the implementation of the ION LRT in the RoW was being perceived, is then discussed, followed by a review of the focus group method used for data collection. Researcher approach to participant recruitment, with real estate agents from the RoW serving as key informants, is detailed alongside the resulting participant sample. Finally, the

ethical concerns related to the involvement of real estate agents as participants are considered, followed by the researchers' perceived limitations of the thesis.

1.2.4. Chapter 4: PAPER 1: Realtor Perspectives on the Impact of the ION LRT on the Real Estate Market in the Region of Waterloo

This paper includes an analysis of real estate agent discussion that presents how the ION LRT is viewed as a mechanism of development within the RoW. Key themes include: encouraging real estate development, influence on employment, regional image, lifestyle choice, aging population needs/wants, local perceptions of the LRT, and connecting the Region.

1.2.5. Chapter 5: PAPER 2: The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada

This paper uses an analysis of the ION LRT to consider a number of recommendations put forward by Higgins and Kanaroglou regarding how best to understand how land value uplift (LVU) is created by LRT systems. The analysis considers the dynamics and effects of accessibility, neighbourhood quality, station area and proximity to stations, local economic processes, city image, and municipal by-laws.

1.2.6. Chapter 6. Discussion and Conclusion

This chapter considers the findings presented in each analysis paper within the context of prevailing TOD literature. It explores how the particular dynamics that emerged during this research add to, reflect or challenge the prevailing TOD literature. Future research and policy recommendations are offered to help improve future research and TOD project outcomes. Finally, a conclusion provides a summation of the key findings of the research and how they might best be useful to practicing planners and academics.

Chapter 2: Literature Review: Transit Oriented Development

Urban form and its associated impacts have been a mainstay of urban planning for most of the modern era. Contemporary North American planning has become particularly concerned with social, environmental and economic issues that have emerged due to the prevalence of the automobile centric development form of the 20th century (Freilich & Sitkowski, Mennillo, 2010). Traffic congestion (Calthorpe, 1993; S. Lee & Lee, 2014), negative health outcomes (Troost, Kerr, Ward, & Pate, 2001; Yin, Yuan, Lu, Huang, & Liu, 2018), social and economic equity (Modarres, 2011), increased greenhouse gas emissions (Ala-mantila, Heinonen, & Junnila, 2013), and environmental degradation (Nazarnia, Schwick, & Jaeger, 2016; Villasenor, Tulloch, Driscoll, Gibbons, & Lindenmayer, 2017) have all been associated with the expansion of urban sprawl into suburban communities. Many of these urban sprawl related issues share strong associations with neighbourhoods that lack access to localized and walkable social and economic hubs. Planning approaches, including new urbanism, TOD, and smart growth, have emerged as means of addressing these issues and promoting increased density in urban spaces, of which TOD has become particularly salient for planning practitioners (Grant, 2009; Nahlik & Chester, 2014; Qviström, 2015).

TOD has been explored from a wide variety of perspectives and methods. Its central premise is to develop density by encouraging development in areas surrounding transit stations. Such development is seen as a means for cities to achieve compact design, moving away from sprawl and shifting travel behaviours in the process (Carlton, 2007; Calthorpe, 1993). The approach has become widely used by planning professionals around the world, who see TOD as a viable alternative to automobile centric and urban sprawl inducing urban planning approaches (Thomas & Bertolini, 2014; van Lierop, Maat, & El-Geneidy, 2017).

2.1. History of TOD

TOD emerged alongside new urbanism as an evolution of prior community design developments, including transit supportive development and pocket communities, and shifts in transit system's policy and development considerations (Carlton, 2007). These prior planning approaches were dubbed *neo-traditional* as they took inspiration from late 19th and early 20th century examples of urban development, particularly Le Corbusier's garden cities theories (Carlton, 2007).

Neo-traditional approaches to development were popularized in the late 1980's and early 1990's, establishing a design language for creating compact and livable communities centered around transit infrastructure, which was touted as providing a basis for allowing cities to develop in a more sustainable and equitable manner (Carlton, 2007). Many of the communities that emerged from the initial implementation of the neo-traditional approach were praised for their walkability and overall feel. These communities were, however, frequently developed without existing urban rail in place, and instead expected rapid transit connections to be built as they reached a critical mass of residents who sought connection to the urban core (Carlton, 2007).

While new urbanists' designs were being implemented by their founding planning practitioners, several metropolitan transit agencies, including Portland, Sacramento and San Francisco, were discovering the benefits of encouraging densities in transit station areas. By encouraging the development of high density, mixed use building surrounding station areas, they were able to increase ridership while encouraging a variety of land uses (Carlton, 2007). Leases and land development agreements were used by transit agencies as a means of building ridership to offset expenses and curb the need for heavy subsidization. In several instances, neo-traditional designers were recruited to aid in these developments, which consequently shifted neo-

traditionalist approaches away from a neighbourhoods first approach and towards a transit first approach (Carlton, 2007).

The combination of transit agency experience and neo-traditional development practices coalesced in the Congress of New Urbanism, from which TOD emerged as a term and its central tenants were created (Carlton, 2007). The essential aspects of TOD that emerged are described as:

- Organize growth on a regional level to be compact and transit-supportive;
- Place commercial, housing, jobs parks, and civic uses within walking distance of transit stops;
- Create pedestrian-friendly street networks that directly connect local destinations;
- Provide a mix of housing types, densities, and costs;
- Preserve sensitive habitat, riparian zones, and high-quality open space;
- Make public spaces the focus of building orientation and neighborhood activity (Carlton, 2007, p. 20).

2.2. Desired TOD Outcomes

Despite the creation of TOD's central tenants, no specific design or form rules have been codified that outline a precise definition of what TOD is or is not. As a result, many urban development projects have been developed as TOD by ascribing to any number of its presumed benefits (Carlton, 2007). While TOD has been associated with a wide array of possible benefits, most desirable outcomes associated with TOD fall under a few key themes, which include:

increased transit system ridership; economic development; enhanced accessibility; improved sustainability; and, social and cultural progress. Each of these desired TOD outcomes is discussed in detail below.

2.2.1. Transit System Ridership

Transit system operators have intrinsic goals of increasing ridership through operations and infrastructure projects. Transit system user fees offset operational costs and increases in ridership provide justification for public funds levied to subsidize operations and to fund future transit infrastructure projects. Early TOD projects were developed with the primary aim of capitalizing on the expected increases to urban rail ridership resulting from increased densities of station adjacent properties (Carlton, 2007; Handy, 2005). Transit operators leveraged properties they owned that surrounded transit stations to offer development incentives (Carlton, 2007). The resulting TOD offset the lack of localized demand by increasing densities in station areas (Pan, Li, Shen, & Shi, 2017). These TODs subsequently increased ridership for generalized system wide metrics, and at specific route and station metrics, both of which are key transit operator measures of success (Handy, 2005).

Shifting resident transportation behaviour away from automobile dependence and towards active and public transportation has frequently been presented as a likely and desirable outcome of TOD (Cao & Ermagun, 2017). However, substantial differences between community design, transit accessibility and population preferences affect how readily communities change behaviour. The belief that urban form alone can affect travel behaviour has been largely discredited. Neo-traditional neighbourhoods that were built without substantial transit access in place have been found to reproduce, or in some instances exacerbate automobile dependent travel behaviour. Residents of these communities have been found to drive as much or more than

post-war suburban communities (Trudeau, 2013). Nevertheless, encouraging behaviour change of residents remains a priority for many TOD approaches, as increases in public transit system ridership offsets many of the issues related to conventional automobile travel.

2.2.2. Economic Development

A growing emphasis placed on TOD and urban rail projects has focused on the economic development that they are perceived to drive. Attracting residential and business development to station areas and within transit corridors has become a sought-after aspect of urban rail infrastructure projects, as municipal policy makers regard these projects as unique incentives that increase their city's competitiveness compared to other municipalities, both nearby and at the international scale. LRT, streetcars, and high-speed rail are considered attractive compared to busses as they represent progress and a future focused city (Higgins & Kanaroglou, 2016b). This attraction is sought to spur both population growth and densification through the attraction of employers to a region. In this way, while project costs may require subsidization from public funding sources, the resulting economic development is considered to likely offset these costs as the desirability of the city increases due to the implementation of urban rail projects.

Employer attraction is considered a central aspect of the economic development resulting from TOD and urban rail systems. TOD is attributed with increasing the catchment area from which employers can expect to hire staff, creating neighbourhoods and businesses employees view as desirable, and by improving the image of a region as an exciting place to live (Topalovic, Carter, Topalovic, & Krantzberg, 2012). These dynamics are especially true for cities that are working to attract creative class businesses and residents, who typically have more positive views of TOD and urban rail compared to other societal sectors (Florida, 2005).

2.2.2.1. Land Value Uplift

Measuring economic development associated with urban rail systems is frequently achieved by calculating the LVU of residential properties surrounding transit stations (Higgins & Kanaroglou, 2016a). Emerging from the work of Alonso (1964) and Muth (1969), LVU is typically calculated using hedonic methods that measure the differences in sales prices of real estate properties either within a central transit corridor (CTC), within station areas, or across time and comparing them with sales prices of real estate properties outside of the CTC or station areas. This approach is guided by understanding property price as an aggregate of the value individuals place on the physical and environmental aspects of properties. The physical and environmental aspects that are considered in most hedonic studies include: the age, floor space, or property size of homes; the proximity of homes to amenities and services; or the proximity and convenience of transportation options (Higgins & Kanaroglou, 2016a, 2017).

Hedonic methods' ability to discern the effect of each aspect of a property's value allows for easily communicable economic statistics. Communicating LVU is thus considered particularly useful for policy makers, as it specifies the increased revenue generated from property taxes resulting from the implementation of a transportation project. This specificity provides a clear basis for defending funding infrastructure, as it allows policy makers to understand the residual budgetary impacts (McIntosh, 2015).

2.2.3. Access

Increasing accessibility is frequently discussed as a desirable outcome of TOD. Páez, et al. (2012) define accessibility "as the potential for reaching spatially distributed opportunities" (p. 141), dependent on the "cost of transportation... and quantity/quality of opportunities" (p. 142). By connecting points of interest, transit systems are seen as providing a means for people to

reach destinations efficiently in terms of cost, time, and convenience. Discrepancies exist, however, regarding how accessibility is quantified/qualified, what opportunities are included, and if/how it is compared between differing modes of travel.

Most hedonic studies generalize what is included within the term “opportunities” and assume that opportunities will be increased within station areas/CTCs (Higgins & Kanaroglou, 2016a). Consideration of how/what opportunities are made available by transit systems compared to other modes of transportation, including by automobile, walking, or cycling, has revealed how spatial distributions of opportunities are likely to effect accessibility patterns (Neudorf, 2014). Likewise, the scale, type, and location of transit system projects all have significantly different impacts on the levels of accessibility provided (Higgins & Kanaroglou, 2017). While streetcars have been identified as less useful in connecting across regions compared to grade separated urban rail solutions, their increased coverage potential per dollar spent, slower speeds and ability to penetrate urban neighbourhoods may provide increased accessibility overall. Increased accessibility from streetcars is particularly likely for vulnerable populations as economic and social benefits would also likely develop in a more diffuse manner compared to grade separated solutions (Condon, Gruenberger, & Klaptocz, 2008).

The provision of affordable housing was initially considered an expected and desirable outcome of TOD under the broader scope of access. Many new urbanists regard affordability and accessibility to desirable locations to be an intrinsic aspect of TOD (Ratner & Goetz, 2013). TOD has, however, been depicted as gentrifying neighbourhoods and decreasing affordability (Revington & Townsend, 2016). In some instances, municipal governments’ efforts to further intensify TOD have resulted in the removal of long-standing affordable housing stock, which is being replaced by high-cost luxury condos (Jones & Ley, 2016).

2.2.4. Sustainability

Density increases resulting from TOD are regarded as producing beneficial impacts by providing a basis of development that limits urban sprawl compared to post-war suburban development. Limiting sprawl is seen as a positive outcome, as it limits urban encroachment on rural farmlands and natural ecologies and creates more compact cities that require fewer vehicle miles traveled (VMT) as a result. By limiting urban encroachment on rural areas and decreasing resident VMT, increased densities are viewed as mitigating localized pollution and greenhouse gas emissions (Lee & Lee, 2014; Procter et al., 2017). TOD also carries a potential to influence urban design to include increased open green space, which can offset urban heat island effects and create more desirable urban communities (Cervero & Sullivan, 2011).

There is little consistency in the literature regarding how/if TOD realizes sustainable outcomes. Arguments have been made that TOD has negligible impacts on traffic congestion and resulting localized pollution effects (Mueller, Hilde, & Torrado, 2018; Stopher, 2004; Taylor, 2004). The inclusion of grade separation, using underground subways or elevated tracks, in transit systems is, however, correlated to increased transit system efficiency and results in lowered VMT and traffic congestion (Litman, 2007).

2.2.5. Social/Cultural

Increasing the compactness of neighbourhoods and drawing on features such as “eyes on the street” from Jane Jacobs were regarded by early TOD proponents as potentially generating positive social outcomes (Carlton, 2007). As such, the urban form that TOD represents was considered as likely to increase social interaction and cohesion among residents across demographic backgrounds. Studies have linked TOD, when developed to support walkability and mixed use design, to increased levels of social cohesion. These increases are generally linked to

self-selection congregation patterns, where people of similar cultural and socio-economic backgrounds move to the same area (Douglas, 2010). Strong indications exist, however, that separations between cultural socio-economic indicators are maintained despite differences in urban form. These patterns suggest that while TOD can provide beneficial environments for social interaction and inclusion, they are limited in their ability to promote cross-cultural exchange (Litman, 2012a).

2.3. Contemporary Understandings of TOD

Early TOD projects' ability to encourage density and increase transit system ridership was influential in the proliferation of TOD as a preferred planning approach. Many North American cities have since developed TOD projects in efforts to realize the benefits they offer. These projects have provided researchers considerable opportunity to explore the effects of TOD in a broad range of locales (Higgins & Kanaroglou, 2016a; van Lierop et al., 2017).

Research findings have, however, caused substantial controversy regarding how effective TOD is at realizing its central goals, and indicated that TOD projects may result in other negative social and environmental impacts. While early proponents of new urbanism and TOD believed that the compact, mixed use urban form they were promoting would result in travel behaviour change of residents, correlations between changes in urban form and changes in travel behaviour have not been observed (Carlton, 2007). Indeed, residents of new urban communities that lack urban rail infrastructure maintain, or even exacerbate their automobile focused travel patterns. Providing additional transportation options has, however been correlated with changes in resident travel behaviour (Handy, 2005; J. Lee, Choi, & Leem, 2016). Rather than encouraging individual behaviour change, this instead suggests changing travel behaviour is associated with shifts in population and demographics (Cervero, 2007).

TODs have also been scrutinized for often not incorporating all of the core tenants of TOD or achieving the presumed sustainability benefits. Studies have found that TOD: is generally not family friendly (Bierbaum & Vincent, 2013; Willcocks, 2011); is often altered during implementation to more closely resemble traditional suburban development (Grant & Bohdanow, 2008); may be resulting in increases to greenhouse gas emission and pollution within already densely populated areas (Tayarani, Poorfakhraei, Nadafianshahamabadi, & Rowangould, 2016); and exacerbates affordability concerns or results in gentrification (Mueller et al., 2018). Within the Canadian context, TOD's effects on affordability are of particular concern, as most of the largest Canadian cities' residents are facing increasing housing costs, frequently pushing them past the generally accepted affordability standard of 30% of income for housing (Moos, Vinodrai, Revington, & Seasons, 2018; Revington & Townsend, 2016).

Cities operating with limited budgets and population growth development demands are consequently restrained in their ability to implement transit infrastructure. These restraints orient cities to prefer pro-traditional-development as they pursue the tax revenue provided by suburbs and high-rises alike while attempting to provide adequate housing for growing and diverse populations (Grant, 2006). Jones and Ley (2016) show that even when affordable housing pre-exists near transit stops, the ability to increase tax revenue through re-zoning and development often outweighs the advantages of allowing the affordable housing to remain in place. These trends are broadly acknowledged as resulting in low income residents losing access to much of the urban core areas, and being relegated to suburban areas (August & Walks, 2017; Mueller et al., 2018).

While a large subset of research has associated TOD with gentrification, several studies have found positive associations between TOD and increased affordability. For example, the

development of TOD provides greater transit access potential to residents living within station areas, which can result in lowered cost of living as this lowers household automobile dependence, offsetting the increases to housing costs (Renne, Tolford, Hamidi, & Ewing, 2016).

2.4. Gaps in the Research

Substantial research exists examining the impacts of TOD on transportation behaviour, land values and economic development, access, and gentrification. The majority of this research has approached understanding these effects from a quantitative perspective, however, leaving a large gap in understanding the underlying causal effects that drive many of the associated findings. Articles examining TOD have found *what* choices people make in response to the implementation of urban rail infrastructure, but few studies have considered *why* individuals make those choices. This research project seeks to fill that gap and consider how the implementation of urban rail infrastructure affects individuals' housing decisions.

As many cities are turning to TOD to address growing affordability, sustainability, and NIMBYism concerns, understanding the underlying processes that help (or hinder) TOD projects' success is of the utmost importance. Improved understandings of the dynamics of why and how individuals interact with real estate amidst the backdrop of TOD will help planners and policy makers create and implement plans that better respond to resident concerns and balance housing market demands.

Chapter 3: Methods

This chapter provides a background on the research approach used in this study to understand how the implementation of the ION LRT was affecting the social and economic dynamics of the RoW. A review of the research philosophy provides an understanding of why a qualitative methodology and case study approach were used in this research. The details of the focus group data collection instrument, including an overview the sample selection approach, a description of the resulting participant sample, and the focus groups format are discussed. Finally, the ethical dynamics of undertaking research with real estate participants and the research limitations of the thesis are discussed.

3.1. Research Philosophy

This research was undertaken with a constructivist approach, which views meaning as emerging from processes of social interaction and interpretation (Creswell, 2013). The constructivist approach focused the research to seek out the emergent forms of meaning that shaped how residents (whose perspectives were derived by using real estate agent's as proxies) of the RoW were engaging with real estate amidst the backdrop of the implementation of the ION LRT.

3.2. Research Approach

3.2.1. Methodological Approach

As the objectives of this research were focused on developing causal relationships between the ION LRT and real estate, a qualitative approach was used. Qualitative research focuses on developing knowledge through methods that directly engage with subjects to understand how they perceive the world (Plays & Atchison, 2008). The qualitative approach is generally seen as

reflecting phenomenological perspectives, which posit that humans are individually unique and are capable of developing independent perspectives of the world. The qualitative approach is generally regarded as being an inductive approach, in that it seeks to develop theoretical understandings of the world, through which experiences and social dynamics can be understood. The qualitative approach is generally concerned with developing understandings of why particular perspectives exist and what factors shape them, towards generating theories and uncovering causal dynamics (Plays & Atchison, 2008).

The advantages of the qualitative approach include the precise descriptions of perspective and its ability to uncover underlying dynamics of social interactions and perceptions (Plays & Atchison, 2008). Qualitative social research frequently involves interaction with, and observation of, research participants to collect data, undertaken by using a variety of interactive and interpretative methods. These methods are typically capable of explicating complicated relationships as they examine phenomena as they are occurring and are able to adjust lines of inquiry as intriguing perspectives emerge, which may otherwise remain latent. The qualitative approach thus allows individuals to express their own perspectives and concerns, which can then be directly considered by researchers, or governmental organizations.

This research project was undertaken to provide a qualitative perspective within a larger research project investigating the impacts of the implementation of the ION LRT in the RoW. The incorporation of this research in the larger project is intended to: 1) provide a source of triangulation, as the resulting mixed methods approach allows for multiple perspectives of analysis and additional layers of rigor; 2) develop understandings of causal relationships, which are otherwise difficult to ascertain from quantitative research; 3) uncover variables that may not

otherwise be integrated into quantitative urban rail and ToD research; and 4) provide a substantive basis of analysis for quantitative studies (Plays & Atchison, 2008).

3.2.2. Case Study Approach

The timing of this study aligned with the final phases of implementation of the ION LRT, which positioned a case study approach as particularly useful. The ability of case studies to examine phenomena within a bound space and time allow for detailed understandings of connected processes to emerge. Thus, implementing a case study approach when most of the infrastructure needed for the ION LRT project had already been built, but when the system was not yet in operation, provided a basis for collecting data on how the project would be useful to urban areas prior to ridership data. In this way, by undertaking this research project in this specific timeframe allowed a greater emphasis of perceptive value, rather than lived use value, to emerge. Further, as “the real business of case study is on particularization, not generalization”, the findings are well situated to inform complementary research exploring the implementation of the ION LRT, while also providing a basis and means of refining other analysis of TOD projects (Stake, 1995, p. 8).

3.3. Data Collection

3.3.1. Focus Groups

To develop an understanding of how the ION LRT was impacting the real estate market in the RoW, focus groups with real estate agents were used as a primary means of data collection.

Focus groups are a qualitative technique in which individuals are invited to participate in a discussion surrounding a particular topic, or point of interest (Stewart, Shamdasani, & Rook, 2007). The insights provided by focus groups are particularly useful in: developing initial

understandings of group perspectives, providing additional context and depth into group perspectives, and aiding in interpretation of research findings (Morais, 2010). They allow for conversation to develop amongst participants, with researchers acting as moderators, to help keep the conversation focused on the central topic. They are particularly useful because of their ability to uncover particular perspectives on a given topic (Morgan, 1998).

Focusing on a central topic is an essential aspect of focus groups that requires careful consideration prior to engaging in them (Stewart et al., 2007). Having a clear understanding of the central research topic is essential, as with the conversational nature of focus groups, the discussion can easily venture into tangential topics that can distract from the central goals of the focus group. As such, the first consideration that researchers need to understand is what goal the focus group is intent on achieving. This goal should inform what the central topic of the focus group will be. What questions are thereby used to develop the conversation will depend on the depth of understanding that is desired, the complexity of the subject matter, and the known attributes of the participant population. While questions are developed and used to keep conversations on track, focus groups seek to establish and expand upon points developed during the flow of conversation, as opposed to group interviews that seek specific responses on each question from each participant (Stewart et al., 2007).

Focus groups generally seek to include between five and twelve participants in the discussions (Morais, 2010; Morgan, 1998). This range is generally identified as effective, as it allows for a variety of perspectives to be heard, but also ensures that most participants will be able to voice their perspectives on any given aspect brought forth during the conversation. Researchers can devise focus groups with fewer participants should they wish to hear more in depth accounts of perspectives on the central topic, as few participants generally means that each

participant will have additional time to speak during a given timeframe. Having fewer participants also allows researchers to ask additional follow up questions, that may not be pertinent to all participants in larger focus groups. On the other hand, focus groups with more participants will provide more perspectives and can provide an understanding of how much consensus, or disagreement, there is on a given subject (Morais, 2010; Morgan, 1998; Stewart et al., 2007).

3.3.2. Participant Recruitment

Real estate agents were considered key informants of how residents of the Region were reacting to the ION LRT as their position required frequent interactions with clients. These interactions frequently involved discussion of how residents viewed the utility and cultural meanings of housing and how these were affected by the ION LRT among different populations. Focus group participants were recruited using maximum variation purposeful sampling methods, to develop as much diversity as possible within the sample that would best reflect heterogeneous perspectives across the Region (Palinkas et al., 2015). As there were no apparent or identifiable realtor traits connected to specific client/resident real estate preference knowledge, all real estate agents from the RoW were included in the target population. Two recruitment approaches were used. The first relied on the Kitchener Waterloo Association of Realtors (KWAR) as a research collaborator to distribute invitations to participate in focus groups, held at the KWAR offices, to real estate agent members. The second method involved directly contacting real estate agencies to hold focus groups in the agency offices, which was undertaken to help provide convenience to real estate agents in the hope of bolstering participation. The Letter of Invitation used to contact and invite real estate agents to participate is included in Appendix A.

3.3.3. Participant Sample

Five focus groups were held with real estate agents through the spring and summer of 2017 for a total of 27 participants. The first two focus groups were held in KWAR offices, while the subsequent three were held directly in real estate agencies' offices. The focus groups ranged in size from three to ten participants and lasted from 75 to 120 minutes. The variation in size and general length of the focus groups allowed the research to achieve a significant level of depth. The larger focus groups provided an understanding of the breadth of perceptions that existed, while the smaller focus groups allowed for more specific discussions of how individuals' perceptions and meanings of housing emerged.

3.3.4. Focus Group Format

A semi-structured interview guide was used during the focus groups to focus discussion yet allow for emergent perspectives to be explored with more depth. Questions sought to understand how real estate agents' clients arrived at decisions regarding real estate and how the dynamics of the RoW and the implementation of the ION LRT were affecting those decisions. By engaging multiple population groups in the study validity was enhanced as they provided a means of maximizing the sample variation, which will either strengthen central themes, or show a lack of consensus (Palinkas et al., 2015). The focus group guide used is included in Appendix B.

3.4. Ethics and the Role of the Researcher

As all research involves ethical considerations, especially projects that involve human participants, this research received ethics clearance from the University of Waterloo Office of Research Ethics. While the risk to participants was relatively low, there was still a risk that participants could be reprimanded based on their comments during the focus groups, or due to quotes attributed to them in publications resulting from the research. As such, participants were

asked to consider the content of the focus groups private and to maintain the confidentiality of all other participants. Comments made during the focus groups were also kept anonymous in all publications. Each research participant involved in the study was informed of the possible risks and their rights to withdraw from research at any time, all of whom signed informed consent forms and received feedback letters, which are included in Appendix C, and Appendix D, respectively.

As the research relied on real estate agents as expert key informants, who had specific knowledge of resident understandings and approaches to real estate, the individual identities of participants were largely irrelevant. As such, no identifying traits were reported in findings, and instead participant comments were attributed to the focus group in which they were stated.

3.5. Limitations

The disadvantages of qualitative research are generally due to the labour intensity that is required to develop findings and that findings are typically not generalizable (Plays & Atchison, 2008). Conducting qualitative research requires a significant amount of time and resources, especially compared to quantitative research. Many of the methods involved require tens, if not hundreds, of hours dedicated to developing data as the methods involved require researchers to directly observe or engage with participants. This limited scope generally translates into an inability to generalize findings, as sample populations are typically too small to infer assumptions onto broader populations.

While using real estate agents as key informants was somewhat effective at generating an understanding of individuals' perceptions and preferences of real estate, not engaging directly with non-professional individuals can only allow moderate certainty in the research findings.

Likewise, without a representative sample of demographic groups from the region, or individuals who are unable/uninterested in interacting in the real estate market, it remains uncertain what other perspectives or dynamics exist that inform individual's approach to real estate.

Chapter 4: Paper 1: Realtor Perspectives on the Impact of the ION LRT on the Real Estate Market in the Region of Waterloo

AUTHORS: Justin Cook, Dr. Jennifer Dean, Dr. Dawn Parker

SUBMITTED TO: OPPI JOURNAL

4.1. Executive summary

Researchers at the University of Waterloo School of Planning (Justin Cook, a master's student, supervised by Professor Jennifer Dean, overseen by Professor Dawn Parker) undertook an investigation into the perceptions of realtors regarding the impacts of the ION Light Rail Transit (LRT) on the real estate market in the Region of Waterloo. This qualitative research sought to develop a deeper understanding of how the implementation of the LRT and changes in the central transit corridor (CTC) were affecting the real estate market in the Region of Waterloo. Real estate agents were identified and invited to participate in focus groups and interviews as key informants using a purposeful sampling technique, which included Realtors from a diversity of client base, location, and brokerage affiliation. The qualitative methods employed in this study complement several of the quantitative research projects being conducted by the Urban Growth & Change Research Group at the University of Waterloo. The findings of this research will ultimately benefit the Region of Waterloo and the research community by providing an understanding of the nature of the relationship between changes in built form, demographics and land value in the Region.

A total of 25 agents participated in focus groups, representing a broad range of experience among, which included agents with 2 to 33 years of experience. All the real estate agents who participated in the study were active as agents or brokers in the Region of Waterloo. While

several agents mentioned also worked in nearby municipalities, most focused on the City of Kitchener and the City of Waterloo, as well as the surrounding townships. Agents were recruited as key informants to share the perspectives of their clients but in a few cases where appropriate, they shared their own perspectives as buyers, sellers, and investors.

The data derived from the Realtor's perceptions indicated that the implementation of the LRT and the development of the CTC were influencing change within the Region's real estate market in several ways. The real estate agents generally viewed the LRT as positive for existing residents, while also helping Kitchener-Waterloo gain status as a "world class city". Of note, the development of the CTC was seen as attracting a wide range of investors, who saw the LRT as a key piece of infrastructure that would further develop on the success of the "tech hubs" and intensify desirable lifestyle amenities. The LRT was also discussed as shifting the perceptions of the Region as it was described as acting as a symbol of a "world class city". Lastly, while the Realtors described long term residents as becoming more favourable of the LRT, they raised concerns that suitable housing was not available for aging populations, who were seeking opportunities to downsize and would benefit from the CTC developments.

4.2. Findings

4.2.1. Encouraging Real Estate Investment

The LRT was perceived by participant Realtors as reshaping real estate investment decisions within the Region. Residents from the Region and individuals from outside of the Region were described as interested in the LRT as it represented an investment opportunity in a growing but relatively affordable housing market (in comparison to Toronto or Vancouver). The land value uplift that has occurred in many cities throughout the world as a result of rapid transit

infrastructure implementation was referenced by Realtors as a primary driver of investors' purchasing decisions. Access to the LRT was seen as a central concern for investors, as proximity to the LRT was understood as being a key predictor of future property value. The LRT development was seen as driving international investment in the Region; however, international investment activity represented a small subset of the overall investor population. Instead, local residents and Toronto residents were discussed as being the major drivers of investment in the CTC. Local investors were described as seeing the potential value of property in the CTC, but not wanting to live there themselves, leading them to often purchase second homes within the CTC as investments. Toronto investors were, on the other hand, described as being interested in residing in the CTC, but often not until a later time when they would be able to transition to living there, or when regional transit connections between the Region and Toronto were more consistently available.

We're seeing investment, local people that are buying in uptown, or downtown just for investment purposes. I think the families, the 30 plus demographic, that are now looking for more investment opportunities, they realize [the CTC] is something they can grasp and they realize that's an up and coming area. – Focus Group 5

4.2.2. Influence on Development

The LRT was described as “transformational” by participants, who saw it as a key piece of infrastructure contributing towards the larger process of revitalization occurring throughout the Region. The growth of the Region as a “Tech Hub” was seen as a long-term project, with the universities and innovation districts serving as central features to attract corporate offices and high-tech employers. Realtors felt that developing the tech hubs in the CTC was more

advantageous than previous efforts, such as RIM Park, because of the centralization and rapid commercial growth in the CTC that drew in prospective residents who would be moving into the Region for job opportunities. The LRT was seen as enhancing the success of the Cities and Region in creating a desirable place for businesses to operate and people to reside. Several participants described how the clients who were interested in living near the LRT were often employed in the innovation districts.

Last year I picked up a condo suite at 1 Victoria, which is at the junction of Victoria and King, something which I would never have done 5 years ago, but that whole place has been cleaned up, you got Google over there. My tenant is a software engineer at Google. The transit hub, the School of Pharmacy, the School of Business, Communitech, D2L, this is the innovation district, which is bustling with activity, and been a major, major change in there. – Focus Group 2

4.2.3. Regional Image

Realtors perceived the transformations occurring within the Region as positively enhancing the area's image as "world class". The LRT was a key symbol of the Region's progressiveness, likened by agents to other global cities such as Toronto, London, Calcutta and Hong Kong. Agents shared a common perception that the Region's focus on developing a strong technology hub served to enhance its status as "the Silicon Valley of the north", and helped attract young professionals and foreign professionals. The development of the "world class city" identity was discussed as differing from long term residents' urban identities, who were seen as more automobile centric and focused on single family home life. While these differing perspectives were raised as concern towards acknowledging existing communities throughout the

development processes, the opportunities afforded to residents by the development of the CTC were understood overall as positive for the Region.

Waterloo is a bubble... a city unto its own; as was Toronto in 1976 when Quebecois went into power, as was Vancouver when Hong Kong was going back to Chinese rule, as was Calgary and Edmonton in the 70s and 80s when oil and gas exploration became an option. And I think Waterloo is next. I believe that we're the next power center. – Focus Group 4

4.2.4. Lifestyle Choice

People who relocated into the CTC were attracted by the lifestyle opportunities that were made possible by the centralization of services and amenities. Agents stated that young professionals in the technology and education sectors were most commonly driven by the appeal of an urban lifestyle. Specifically, the walkability of the CTC played a significant role, as amenities and services were available in close proximity to employment and housing. Further, the increasing development in the CTC was considered to provide access to many of the services and cultural amenities that these professionals were used to having in other cities, such as Toronto or Vancouver, resulting in the Region increasing its competitiveness in attracting these professionals.

The people coming from Toronto, or other big cities are a lot more open to, or interested in the idea of proximity to public transit. – Focus Group 1

4.2.5. Aging Population Needs/Wants

Aging populations were discussed by Realtors as a population who were expressing interest in and could benefit from the intensification in the CTC. Like young professionals, the

increased accessibility to services within walking distance coupled with the lifestyle and amenities offered in condominiums, was discussed as desirable for older adults looking to downsize. However, Realtors shared that the existing housing stock in the CTC were largely unappealing to older adults because they were seen as too small (e.g., single-bedroom condos) or too costly (e.g., in some cases equivalent to the price of a single-detached home). This provided little incentive for older adults to downsize, which according to some realtors, contributes to a reduced stock of desirable single-detached homes outside the CTC, which was perceived as a contributing to an upward pressure on home prices and unaffordability in the Region.

The downsize market, they very specifically want main floor, bungalow, massive bedroom, laundry, everything on the main floor type housing. This region has blown it 100% in planning for that. We do not have it. A person selling an \$800,000 house has to [pay \$790,000 to downsize]. – Focus Group 4

4.2.6. Local Perceptions of the LRT

According to realtors, long-term residents' perceptions of the LRT were shifting from negative to positive. Construction was a central concern for local residents but was diminishing as major portions of the construction were completed. Long-term residents living outside the CTC were reported as unlikely to use the LRT as a means of transportation with the exception of students (both high school and university).

What I'm getting from my clients, not all of my clients, but... the people who were born and grew up here are just not getting [the LRT] because they're North American; the car rules, they have families, and they're never going to use it. – Focus Group 2

Many participants compared the negative reactions to the LRT as being similar to those expressed in reaction to the development of the expressway (Conestoga Parkway), which is now viewed as an essential piece of infrastructure for the Region. These comparisons showed how Realtors perceived the LRT as a long-term investment in the Region, the success of which would become more apparent over time as residents became more reliant upon it.

The expressway system was the forbearer to what we have now and [the LRT] is just another inclination that the Cities will survive because of the intuitiveness to get this project moving. – Focus Group 3

Well when they started building the expressway in 1965, it wasn't being built for the drivers of 1965 it was for the drivers of 1975 and 1980. And the LRT isn't being provided for anyone in this room. – Focus Group 3

4.2.7. Connecting the Region

The LRT was described by many participants as a piece of infrastructure that would help to connect the Region of Waterloo with the larger southern Ontario region. Specifically, the LRT was appealing to a new market of residents who could now easily access GO train services that would connected them to Toronto. Combined with the relatively lower housing prices in the Region, the ability of the LRT to connect residents in KW to their employment in Toronto was discussed as a major factor influencing the influx of newcomers to the Region.

The biggest problem I still have is what are they doing about the 401. That's what I keep getting, "why are they spending all of this money on the LRT when we can't even get to Toronto by train?", and I get that a lot... Not by

train but... high speed, quick, not just all day. They want to be in there in an hour... like euro world class rail. – Focus Group 2

Within the Region, the LRT was seen as helping to bring together Kitchener and Waterloo as a more seamless urban environment and diminish the perceived socio-economic differences that exist(ed) between the cities. The implementation of the second phase of the ION into Cambridge was described as an important next step to tie the Region together as a unified whole.

These cities are so close together, [the LRT] will unite the cities. The tri-cities will become one, it will be great. – Focus Group 4

4.3. Conclusion

The findings of this research show how the implementation of the LRT is resulting in dramatic changes throughout the Region’s real estate market. The intensification of the “Tech Hubs” associated with the development of the CTC is helping to attract employers, real estate investors, and newcomer residents. By ensuring that the development of the CTC is guided by planning policy that is responsive to the needs of long term residents, most notably the aging population of the Region, there is strong reason to believe that the LRT will be celebrated long into the future.

The continuation of this research project will seek to further uncover how the development of the CTC is affecting residents’ relationship with housing, and how LRT access and investment considerations are affecting home choice decisions. The data will also be used to build upon and/or substantiate the findings of several of the other studies being conducted in the Urban Growth and Change Research Group, including the recent renters’ survey, the forthcoming buyers/sellers survey, and previous work done on developer perceptions and hedonic modeling.

Chapter 5: Paper 2: The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada

Authors: Justin Cook, Jennifer Dean, Yu Huang, Dawn Parker

Submitted to: Canadian Journal of Urban Research

Acknowledgements: We would like to thank: SSHRC for providing funding for this project through the Partnership Development Grant; KWAR for assisting with participant recruitment; the participant Realtors for sharing their valuable insights; the Region of Waterloo, City of Waterloo, City of Kitchener, and City of Cambridge for providing feedback; and Jacob Clemens for developing the context map.

5.1. Abstract:

Hedonic methods are frequently utilized to evaluate the success of light rail transit (LRT) systems. While quantitative measures of land value uplift have developed correlations between urban form, housing attributes and real estate desirability, understandings of why particular factors are valued by residents and considered in hedonic studies remains largely unexplored. This research uses qualitative methods to uncover the causal relationships between housing attributes and the implementation of the ION LRT system in the Region of Waterloo. By conducting focus groups with Realtor participants, we consider how the dynamics of accessibility, neighbourhood quality, station area differentiation, economic processes, city image, and municipal by-laws affect resident perceptions of real estate and its relative value. Qualitative research methods also provide a basis for improving the variable selection and interpretation of future hedonic studies of LRT systems.

Keywords: residential markets; light rail transit; hedonic modelling; realtor perspectives; neighbourhood change

The impact of light rail transit on residential markets: A qualitative study of land value uplift in the Region of Waterloo, Canada

5.2. Introduction

The development of light rail transit (LRT) systems in urban areas has been associated with a range of outcomes related to health, social equity, sustainability and economic development (Cao & Ermagun, 2017; Knowles & Ferbrache, 2016; Ferbrache & Knowles, 2016, 2017; Hong, Boarnet, & Houston, 2016; Knowles & Ferbrache, 2014; Liu, Deng, & Le Vine, 2016; Procter et al., 2017). The complex relationships between transportation, land use, urban development, demographic change and quality of life pose challenges, however, for understanding the independent impact of a new LRT system on surrounding urban environments. In many urban contexts, this information is crucial for decision-makers to justify large scale investments in new public transit infrastructure, or to understand drivers of rising housing markets.

Understanding the causal impacts of LRT projects on urban environments requires methods that can isolate the effects of transit systems from other correlated factors. One frequently used method is hedonic modelling, which is based on the hypothesis that the value of goods is determined by a range of utility-bearing characteristics provided to consumers (Lancaster, 1966; Rosen, 1974). In the case of residential markets, housing is a special commodity with a unique set of attributes, such as lot size, location, and environmental amenities, each of which can be estimated using the hedonic regression model (Sirmans, Macpherson, & Zietz, 2005). As LRT is a housing attribute that influences prices, its value can be isolated using hedonic regression (Hurst & West, 2014; Mohammad, Graham, Melo, & Anderson, 2013). The price difference of properties attributed to an LRT system is commonly referred to as land value uplift (LVU) in hedonic studies (Cervero & Duncan, 2002; Higgins &

Kanaroglou, 2016a;) . To date, researchers investigating LVU in residential markets have heavily relied on hedonic modelling to determine the relative impact of LRT systems, despite several limitations of this method. This study aims to fill some of these gaps, outlined below, by utilizing a qualitative approach to understand the drivers of LVU during the implementation of a new LRT system in the Region of Waterloo (RoW), Canada.

This paper will provide an analysis of variables associated with value by urban homebuyers in the RoW as a basis from which causal relationships can be established and to improve which/how variables are used in future hedonic studies exploring LVU associated with LRT projects. The analysis is accomplished by a review of how common variables are used in hedonic studies and by establishing which variables have been most scrutinized by researchers. The qualitative focus group methods used to collect data are reviewed next, followed by a presentation of the resulting data according to the identified common variables. The results are subsequently discussed in relation to the identified common variables, as either confirming how they have been used in previous hedonic models, or positing a need to adjust how they are considered and used. Finally, recommendations are presented that contextualize the importance of qualitative research when studying LRT effects.

5.3. Land value uplift and transit investment: Areas of clarity and convolution

Researchers at the forefront of LRT related LVU research in North America, have recently undertaken efforts to improve the precision and accuracy of hedonic methods (Higgins et al., 2014; Higgins & Kanaroglou, 2016a, 2016b, 2017). Through their efforts, several shortcomings of the method have been identified that show the limits of hedonic methods to make causal connections between LRT investment and LVU. For instance, the value of a feature can only be estimated if controls are integrated that accurately account for other influential features. Many of

these features may be unknown, however, resulting in omitted variable bias (Kuminoff, Parmeter, and Pope, 2010). Higgins and Kanaroglou underscore this point in the context of LRT and LVU stating: “*previous research has suffered from a lack of empirical specificity that results in omitted variables related to drivers of LVU in station areas.... This results in many unobserved effects and potential bias in research outcomes*” (2016a, p. 611). To limit these effects or biases, six variables have been identified, which are external to rapid transit but could be simultaneously impacting LVU (Higgins et al., 2014; Higgins & Kanaroglou, 2016b, 2016a, 2017).

1. Accessibility

This variable is inconsistently defined in hedonic studies. Higgins and Kanaroglou (2016a) discuss how accessibility is generally operationalized using measures of walking distance proximity to transit stations under a standard assumption of 800 meters. Páez, et al. (2012, p. 141) define accessibility “as the potential for reaching spatially distributed opportunities”. This definition problematizes the normalized 800-meter accessibility measure of station area LVU, as the assumption that accessibility opportunities will be increased with the implementation of an LRT is dependent on how well the project can increase accessibility compared with other existing modes of travel within the study area (ex., walking or private vehicle). Comparisons to other modes of travel should include considerations of time, cost, ease of use, travel mode perceptions, and the range of destinations considered as opportunities, as measures of accessibility are affected by factors of spatial dependence, traffic congestion, automobile ownership affordability, access to places of work or services, and the attractiveness of alternate transportation options (Higgins & Kanaroglou, 2016a; Neudorf, 2014). Accessibility measures

will also likely differ by station area, and larger urban factors, such as the pre-existence of transit oriented development associated amenities (Higgins & Kanaroglou, 2017).

2. Neighbourhood Quality

Neighbourhood quality is particularly susceptible to omitted variable bias due to a lack of specificity and standardization as to which physical and social indicators can be used to identify differences between lots and neighbourhoods. Common indicators include streetscape quality, housing condition and age, presence of industrial uses, crime rates, school quality, and neighbourhood perceptions, though Higgins and Kanaroglou suggest that the importance of indicators will vary between locations and populations (2016a). Heterogeneous population preferences are important considerations when interpreting data as strong preferences of even a relatively small population, such as investors or culturally motivated buyers, could affect LRT area LVU more than may otherwise be generalizable across a region's population. Ensuring that chosen variables closely align with buyer preferences will ultimately yield more precise and comparable transit induced LVU estimates (Higgins & Kanaroglou, 2016a).

3. Station Area/Proximity

Most hedonic studies measure LRT induced LVU by amalgamating all properties within a given proximity to a transit line or station areas in order to compare with properties outside these areas. This is problematic, as station areas vary drastically depending on their location within an urban environment. This type of amalgamation can result in underestimating the impact of LRT on LVU (Higgins & Kanaroglou, 2017). To address these concerns, Higgins and Kanaroglou (2017) developed a classification system for station areas that would allow hedonic models to

better reflect whether the built environment surrounding LRT projects supported or suppressed LVU.

4. Local Economic Processes

Economic processes can positively or negatively affect the availability and quality of employment opportunities accessible by LRT systems. As such, Higgins and Kanaroglou (2016a) recommend economic processes and/or employer attraction as an independent variable. While studies have taken economic trends into account while discussing hedonic analysis findings, local and regional economic processes have not been integrated as independent variables in hedonic models (Hess & Almeida, 2007).

5. City Image

The role of LRT systems as a tool for city branding is important to consider with respect to LVU. LRT systems are often key indicators of ‘global city’ status, which can influence settlement choice and subsequently LVU (Ferbrache and Knowles, 2017; Higgins and Kanaroglou, 2016b). However, no studies have explored the extent of city image impact on LVU empirically.

6. Municipal By-Laws

Zoning by-laws have a direct impact on development and can induce significant LVU. Intensification supportive zoning can incentivize developers to build in areas surrounding transit infrastructure but only when it makes economic sense (i.e. when greenfield land is limited/unavailable). Zoning should thus be considered as an independent variable, given that

station areas often have differing zoning and/or will often undergo zoning review during implementation (Higgins & Kanaroglou, 2016a).

In addition to considering these six variables, Higgins and Kanaroglou (2016a; 2016b; 2017) recommend that researchers incorporate their knowledge of the context of the research site in order to incorporate relevant local market variables. However, this recommendation assumes that hedonic researchers possess detailed knowledge of local markets and fails to provide a means for researchers to develop this knowledge.

5.4. Research Site: The Region of Waterloo

This qualitative study is part of a larger mixed-methods research project investigating land market change caused by a new LRT implementation, in the RoW. The RoW is an upper tier municipality with a population of 594,000 located approximately 100 kilometers west of Toronto. The RoW is comprised of seven lower tier municipalities; four rural townships and three cities; City of Waterloo, City of Kitchener, and City of Cambridge (Region of Waterloo, 2018). The urban areas have undergone rapid development associated with the recent success of its post-secondary institutions and high-tech sectors, which account for 9.8% and 9.1% of the employment base respectively. These emerging areas of employment have diversified the employment base beyond the long-established manufacturing (17.5%), health, social services and public administration (12.1%), and finance and insurance (8.3%) industries (Region of Waterloo Planning Development and Legislative Services Community Planning, 2017). The Region is home to Research in Motion/Blackberry and is a major training ground for future talent in computer science and engineering (through the University of Waterloo), which has influenced the influx of high-tech employers to the area including Google, Shopify, and OpenText. Additionally, the Region is well connected to other cultural and economic centers

with its proximity to the Greater Toronto Area and location within the Southern Ontario mega region/innovation corridor. While Southern Ontario is generally well connected, issues related to minimal inter-municipal rail services and congestion along highway 401 limit the effectiveness of transportation connections.

In 2011, the Region and lower tier municipalities approved the LRT system, called ION, after securing approximately \$800 million in funding through a partnership between municipal, provincial, and federal governments. The first phase of the project includes a 19-kilometer north-south corridor that connects the downtown cores of Waterloo and Kitchener, which is scheduled to open in mid 2019. Phase 2, an 18-kilometer extension south into Cambridge, is still in the planning process and is currently served by a bus rapid transit system (Region of Waterloo Planning Development and Legislative Services Community Planning, 2016).

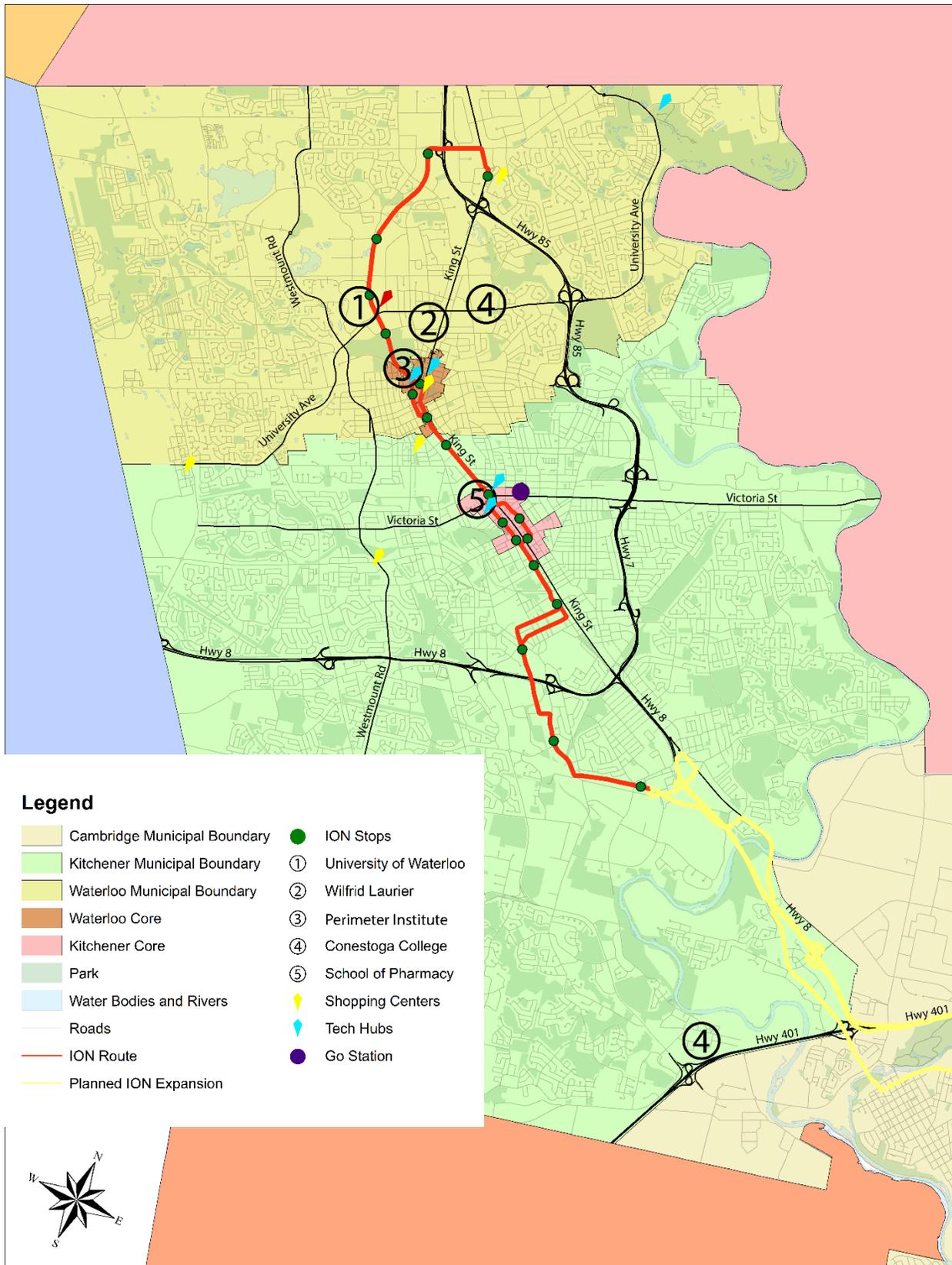


Figure 1 – Map of the Region of Waterloo
 Map Credit: Jacob Clemens

5.5. **Research Methods**

This explanatory qualitative study used the focus group method to gain insight into the local factors that influence residential markets and LVU. Explanatory qualitative studies shed light on processes, and relationships between phenomenon (Given, 2012), as called for by Higgins and Kanaroglou (2016a; 2-16b; 2017). As well, a growing body of economic literature highlights the importance of qualitative research for interpreting and validating the design and outcomes of quantitative models (Piore, 2006; Styśko-Kunkowska, 2014; Wallace, 2004), including hedonic models assessing factors that influence land markets.

5.5.1. **Recruitment and sample**

Real estate agents were designated as expert key informants for the study, as their profession requires them to hold deep knowledge of local markets both in terms of temporal changes in property values and the desired property/community features that increase buyers' willingness to pay (Patton, 2015). Realtors were purposefully sampled because of this expertise, but many also had first-hand experience purchasing properties in the transit corridor (Patton, 2015).

This research was conducted in collaboration with a local realtor association that facilitated the recruitment of participants. The association acted as a gatekeeper by e-mailing a letter of invitation to all agents in the Region and hosting two focus groups in its office (Patton, 2015). The remaining three focus groups were conducted at individual brokerages, once again recruiting agents through an e-mail sent by the brokerage administrators.

5.5.2. Data Collection and Analysis

A total of five focus groups with 27 realtors were conducted in the spring and summer of 2017. The focus groups lasted between 75-120 minutes and were held in boardrooms at the association and brokerage offices with lunch provided. These were attended by 2-3 member of the research team, using a semi-structured focus group script that allowed a high level of interaction between participants (Patton, 2015).

Focus groups were audio recorded and transcribed for thematic analysis (Patton, 2015). The primary codes were created a priori based on the literature and the six variables related to LVU, while secondary codes were derived by members of the research team based on emerging data. This study received ethics clearance from the University of Waterloo.

5.6. Results

The findings are organized into six subsections that correspond with the variables associated with LVU and are organized in order of significance to participants in the study.

5.6.1. Accessibility

5.6.1.1. Relative Accessibility

The first broad conceptualization of accessibility related to travel by all modes across the Region. Like many regions in Southern Ontario, Waterloo has historically favoured development that supported automobility, and this was reflected when realtors shared that home buyers are largely interested in access to major highways:

You don't spend 3 hours on the road as these Torontonians do... you can get from one side of the city to another part of the region in 20 minutes [with] this expressway that we have. - Focus Group 2

The accessibility advantages of the LRT were considered limited due to the relative dominance of the automobile in the Region. Relative accessibility was also discussed temporally, however, with accessibility advantages not necessarily realized by the current population that future generations would benefit and use the LRT as a means of improving their accessibility:

People are saying 'I don't care, our generation relies mostly on our cars.' Even us as real estate agents use our cars and won't conduct business using the LRT really, and a lot of us are thinking 'we are going to bear the expense but are not going to reap the benefits.' In the grand scheme of things the community will benefit, but on a personal level the thought is 'I am never

going to use that. I am paying for it, but I am never going to use it'. – Focus

Group 3

Accessibility, for most participants, was conceptualized at a system level LRT vs. personal vehicle convenience and opportunities. Thus, the introduction of the LRT was perceived by realtors as not improving accessibility for residents who were already well-served by the Region's convenient road networks, but through development LRT accessibility would allow it to be a viable alternative.

5.6.1.2. Population Accessibility Preferences

Despite the prevalence of automobile dependency that supported suburban lifestyles in the Region, several subpopulations were identified as excited by the potential increased accessibility associated with living in or near the LRT corridor, including the younger and older generations:

There are a range of youngsters who are getting into the market who are very pro-LRT. The group in the middle, who are old-time KW people, who are saying 'what are you doing to our town?' And then you've got another group who are a little bit older and are downsizing and are excited to sell their [suburban] home and move to a smaller [more urban] home. Still in the area but able to take advantage of the rail line to access the amenities that they already know are there. It is giving them a new perspective to work with. -

Focus Group 3

While LRT station areas were discussed as ideal spaces for aging residents, who wanted access to walkable amenities and services, many residents found the predominantly high-rise housing stock to not be suitable, as units were often too small or too expensive. These barriers

resulted in many aging residents opting to remain in their suburban homes until alternatives were available:

The clients that I'm getting who are moving downtown, the old generation are actually excited that they can get rid of their car and that they don't have to worry about that anymore. The LRT is definitely helping with that it makes it easier. – Focus Group 1

There's not enough... complexes for seniors... unless it's the very expensive [ones]. You sell your house and [think] all that money is going to last you a few years. The idea where we live in a big house, we're going to sell it, buy a condo and that \$300,000 [leftover] is to enjoy and help kids. [People] can't do it. They sometimes have to borrow money to buy something else. – Focus Group 5

Participants most often discussed young professionals and people relocating from other developed urban areas as most amenable to using public transit as a primary mode of travel. This population was described as seeking urban lifestyles, which also aligned with emerging environmental attitudes:

I think people are becoming eco-sensitive. If you go back ten years ago the idea was more garage the better, which is not such a priority anymore. Some condos in CTC are offering one parking spot for their larger units instead of two or three, and that seems acceptable. More electric vehicles, LRT goes along with that. People are really buying into that. – Focus Group 3

In fact, many argued that the LRT project was beginning to change the demographic landscape of the urban core areas, which had a two-fold impact on the surrounding areas. First, it brought an influx of new people with new perspectives and lifestyles to the core, and second it increased development in the area to support these new populations. For instance, the downtown cores were seen as attractive to people working for the tech sector, as they could provide access to workplaces and lifestyle amenities within walking distance:

I think now the Google people, the young hipster people, they're more interested in Kitchener. They'll want to be [buying property] where they're working because that's how they view their lifestyle. So, I think [accessibility] depends on the clientele you're dealing with. - Focus Group 1

Realtors also stated that the growing immigrant populations in the region were drawn to communities with cultural amenities (e.g., places of worship, ethnic food stores) and high-ranking schools. Immigrants were described as very mobile in the years after first settling in the region as they develop their knowledge of local neighbourhoods and amenities, and move to be in close proximity to those:

You will find that immigrants will migrate to other immigrants from their country. If they're renting, they're meeting people at community centers, and then they will be happy to move in to a similar neighbourhood where there are people from a similar background. Put up a [place of worship] of a certain denomination and people will [want to be close to it]. – Focus Group 2

The diversity of population specific amenity preferences and considerations was identified as highly influential on settlement patterns. The differences between long term residents and new

residents was identified as likely causing a perception divide between people who lived within station areas compared to those living outside of them. The importance of cultural specific amenities was further identified as a key consideration for residents throughout the region, both inside and outside of station areas.

5.6.1.3. Low Income Concerns

Lower income households were discussed as being displaced by the new development along the LRT corridor as realtors perceived much of the new housing stock as targeting the luxury market and lacking an appropriate allocation for affordable housing units. This gentrification process was identified as generally decreasing accessibility for low income residents:

We have to increase the housing supply for people who make less money.

We don't have to give them free housing, or social assistance housing, or co-op housing; We have to make the community affordable for people who work at [lower income jobs]. – Focus Group 4

In one example, the LRT tracks severed an informal pathway between a low-income neighbourhood and a nearby retail area:

I'm talking about [residents] on [street] who are saying, 'I'm cut off!

[The LRT] acts as a barrier to what I need to do.' So that's an inequality... a justice issue of the LRT. - Focus Group 2

These sentiments echo the emerging body of literature that describe infrastructure-driven gentrification (e.g., Jones & Ley, 2016).

5.6.1.4. Regional Accessibility

Realtors considered the LRT's connection to the Toronto rail service (the GO train) as fundamental feature, as it served to connect the southern Ontario region together as a whole:

I think if the LRT were just going north and south it's not going to be a success; the minute they can have a fast Go, or some kind of high speed train that goes to Toronto, now you're opening up that demographic too... The locals will use it to get from the north end of Waterloo to the hub to get on a train to Toronto for a Blue Jay game, or a concert. – Focus Group 5

This connection was providing a means for Toronto residents to relocate and take advantage of lower local real estate prices while remaining connected to the job centers, services, and amenities available in Toronto:

The GO train comes out here. I know a stock broker who works on Bay street, makes lots of money and he takes the GO train from Kitchener. It's a long way - 15 stops, an hour and a half, but he's fine with it because he has a great big house out here, and if they do go ahead with 19 billion dollar rapid transit all the way to London, through Kitchener/Waterloo; because now I can sit on that train, do 250 km/h to union station and be there in a heartbeat. – Focus Group 4

By connecting the southern Ontario region as a whole and the RoW with Toronto the LRT was depicted as being a localized piece of transit infrastructure that was connecting the broader southern Ontario region.

5.6.1.5. Proximity Measures

Proximity to the LRT was considered a positive housing attribute. The range of desirability estimated by Realtors varied, from 800 meters to a kilometer, or about a 20-minute walk:

The first-time homebuyers want to be close to [the LRT]. They are bussing to our appointments and I ask them if I can pick them up, but they say 'oh no, we can take the bus. We want to see how long it takes and how it works,' or whatever... Even some of the older demographics... are definitely buying to be close to it, not right on it but somewhat close to it, within a block or two. – Focus Group 3

Many of these descriptions seemed, however, to be informed by normative estimates from research studies and government documents:

So, kids are into the LRT, but that's already happening, prior, separate, worldwide. We know it impacts every modality with its 600 meter, 800 meter rule, 400 meter rule. – Focus Group 2

In contrast to the generally positive association with LRT station proximity, direct adjacency to the LRT route was discussed as likely having a negative association to property values. Residents perceived LRT adjacent properties as generally diminishing individuals' enjoyment of their property due to the train noise or increased pedestrian traffic:

I wonder about the homes that are right up on the track and their fears have been assuaged by developers of the LRT who are saying 'it's only going to be this loud' ... and 'you are only going to feel such and such'. I am curious to see how they are going to react when it is up and running on a daily basis,

and how it impacts their daily lives and their enjoyment of their property. I am not trying to be a Negative Nelly, but I would like to look at that aspect of it and see if those people are going to start to sell off, or if they are going to react negatively and say, 'I am out of here'. – Focus Group 3

Proximity considerations generally reflected prevailing station catchment area norms, however, population dynamics, such as older generations being more likely to value closer station proximity, or direct adjacency negative impacts are important considerations.

5.6.2. Neighbourhood Quality

Many of the Realtors discussed how their clients were unwilling to undertake renovation work, instead prioritizing properties that were “move in ready”, as they provided immediate connection with desirable lifestyles:

My clients do not want to buy work so they like move-in ready. They want to buy their parents' house; granite countertops, big bedrooms and great rooms, they want to have what they had before. People used to want to finish a basement or fix up parts of a home but now there is a preference for move-in ready; they want all the work done. – Focus Group 3

Immigrant clients, who were discussed as being less familiar with local/Canadian housing forms and standards, were described as much more likely to seek out newly constructed housing as it provided assurances of reliability:

Immigrants want new or newer homes and now that we don't have many lots available they will be satisfied with a well-kept two to three, or 10 to 15 year old home. They don't want the mechanical issues that a 15 year old home

might require (furnace, roof). They don't know the construction practices and get scared. – Focus Group 5

The desirability of particular housing styles was largely contingent on demographic considerations; families with children sought single detached homes with yards and young professionals sought condos:

We don't have enough [senior oriented condos]. We need those condos for older people, not for the young families. The families with young kids won't stay in an apartment building to rent, Young professionals will. – Focus Group 5

Aging clients, meanwhile, sought bungalows or large condos that would allow them to downsize into a property that allowed for a gradual transition from a 2000+ square foot single detached into a 1200-1500 square foot living space:

Maybe if condos were larger [the aging population might consider them]. To move from a 2,500 square foot house to a 800 square foot condo is a big culture shock. They want that evolution of going to a 1,500 square foot bungalow, and then maybe a condo. – Focus Group 5

While housing style preference varied dramatically based on demographic preference, a general trend was acknowledged that clients wanted properties that required less maintenance. This trend was most readily acknowledged for families seeking single detached and that they were more inclined to look at properties that had smaller yards:

Because a lot of families are now two working parents they don't have the time or inclination to do lawn work. We even find people are willing to

spend as much or more to have a newer home on a smaller lot and they're not worried about the time to mow the lawn. They're both working and have kids that are running all over the place. They don't care as much about having the property, they just want the new house with the new amenities and they don't have to worry about; just go in and live. – Focus Group 5

Associations to class, affluence, or poverty were used as baseline indicators of neighbourhood identity. Perceptions of Kitchener were associated with blue collar work and crime, while Waterloo was associated with white collar work and affluence. These perceptions were, however, challenged by realtors who noted that while these perceptions may be reflected in home prices, they did not reflect actual crime statistics. The development trends of many high-tech firms locating in Kitchener's downtown were further blurring the perceptions of each city:

Being somebody who wasn't born here or grew up here, the way I always explain [the Region's lower tier municipalities] to people is... that Waterloo is white-collar, and that Kitchener is blue-collar... I'm seeing it change though... in 10 years between the two now that you're getting new neighbourhoods. But generally, homes cost less in Kitchener compared to Waterloo. – Focus Group

2

The perception of individual neighbourhoods was found to be important as well, however, only a few of the Region's neighbourhoods were described as having developed unique identities:

We just redid our website to put a neighbourhood page in there. I got the idea from a company out of Toronto, where you have the Beaches, Young and

Eglinton; all of their areas are like little cities and people there would say 'I gotta be in the Beaches' or 'I gotta be there'. I don't think we find that as much here, I think we're seeing a little bit more, especially because the last year we have more Toronto buyers that would buy here. – Focus Group 5

School quality was discussed as a proxy for families to determine neighbourhood quality, with the Fraser Institute rankings serving as a primary indicator of school quality:

[Families] want to be in, for the most part, the [school] boundary. I would say it's one of the hottest boundaries out there. [School] has a good boundary, it is changing, [school], because it's a newer school, is doing better as well now. – Focus Group 2

Using school quality as a means of determining neighbourhood quality was, however, regarded as a self-fulfilling prophecy, as Realtors discussed how this method attracted families who could afford to purchase homes in a given school district were often also able to provide the additional support to their children to assure their academic success (including after school assistance, and providing additional resources to the school):

I disagree with the Fraser Institute because what you end up doing is having the best schools in the most affluent neighbourhoods and that just breeds more affluence. Of course, they're going to be great schools, you have stay at home moms who go in every week, twice a week, to do the strong start program. They have the time. But you're not going to find that in a less affluent neighbourhood where both parents are working, or a single mom, or a single dad. – Focus Group 2

The process of self-selecting into the best school districts was part of a broader population congregation trend. The downtown cores were discussed as attracting young professionals, who wanted to be close to their places of work and have access to many of the consumer amenities that catered to their lifestyle preferences:

Young professionals [want to be downtown]. In Toronto everyone grew up in an apartment building, so for them to move downtown it's not a change.

Focus Group 5

The universities were considered as being only appealing to university students, and participants reported that many people avoided the area, considering students to be poor neighbours. The recent student housing developments were depicted negatively, as the form catered solely to students and detracted from pre-existing neighbourhoods:

The only [negative neighbourhood quality] that I've run into is the older generations [who do not want to be] close to student housing. They always ask me 'where's the next closest student housing' when I'm showing a house... [My clients are worried about] noise, there's always alcohol involved with students, annoyed at obnoxious groups of students, property damage or absentee

landlords. – Focus Group 1

The importance of neighbourhood quality was an important feature that was associated with housing desirability. This desirability was primarily expressed in terms of housing's built quality and form, however, the perceptions associated with neighbourhood identities and safety were described as highly influential.

5.6.3. Station Areas

When discussed, station areas were primarily generalized, with only a few of them referred to directly by participants. The downtown cores of the region were, however, frequently discussed as focal points of LRT intensified development:

The shift [towards young professionals] can be seen along LRT line. I have sold 5 properties on Victoria and King, for purpose of convenience. Condos actually... There is great demand, near the hub there at Victoria and King where you have the school of medicine, school of pharmacy, Google, Communitech, D2L, and new office of Deloitte. That is really a hot area then.

– Focus Group 3

Development was described as spreading outward from the cores, and to a lesser degree from the tail ends of the LRT. Development was expected to eventually grow around each of the station areas:

If you look at the Fairview end there is probably room for some density growth. Other than that [development will happen] just in the direct cores. I think it takes a long time, but if you look at other cities that have a subway or go train, wherever you've got stations, within 15 or 20 minutes of it becomes a better thing. It will just pull out from the centers eventually. – Focus Group 1

The development of high rise condo buildings around station areas was attributed to increases in demand associated with the influx of new and younger demographics. Realtors understood the downtown station areas as key sites of development as they provided access to lifestyle amenities that were preferred by younger and migrating buyers:

[The younger generations are] looking at lifestyle first, and they're looking at living quarters as just that; where they go home and sleep at night. The LRT is expanding on it because with each station there will be a lot of condos starting to pop up, just like Toronto, just like the Young and Sheppard line. Just as you drive down the 401 and every time you see a big pack of condos you know there's a train station right under them. – Focus Group 4

Speculative investor market capitalization of housing surrounding the station areas was emphasized as stimulating significant LVU. Realtors described how properties surrounding the station areas were being bought by investors, as they understood that future development around station areas would likely result in higher increases in home prices:

The investors that are coming here that want to rent out a house are looking around the LRT, and the people that want to move here themselves were more interested in around the Go-train. – Focus Group 1

Station area connection to Toronto commuter options was depicted as a potentially important consideration that could cause station area LVU. This LVU was described as dependent on station area parking availability, as parking could allow residents to maintain similar access to high speed rail services while living in homes that were otherwise inaccessible by transit:

Not enough parking will probably affect commuters. If [a high-speed] train comes along and gets to Toronto in 45 minutes I think half of the commuters would take the train. If they take the LRT to the train station, that's fine, we are just hoping it's for the best. – Focus Group 5

The differences in station areas are important considerations, that are affected by the pre-existing urban form and development processes. While core areas are most likely to experience LVU, the development of additional commuter options and zoning decisions will likely have a drastic impact on system use and resident's housing preferences.

5.6.4. **Economic Processes**

The development of the tech hub (located across the downtown cores of the Region and around the Universities) was considered a key factor influencing the development of the region:

We embrace [technology] over here, but with the falling dollar... Google is sending their people [here]. They're like wow 'it's 72 cents in Canada lets send all our California students'...Google's trying to build another building. They already leased out another 200,000 square feet last year. They're growing. – Focus Group 4

Corporate entities were discussed as locating in and around the downtown core because of the LRT, a trend that was expected to continue:

The investment that we see, in a real estate perspective, all the condos, the google building, now you're looking at the Zehr group building; those are only there because of the LRT. – Focus Group 5

Investors were depicted as comparing the LRT with international examples of mass transit that have experienced large LVU as a result of their implementation:

Basically, and historically, Vancouver's SkyTrain has been so successful, property values have been skyrocketing there... It all started in London

England with the underground... property values have increased in London by 10 to 25% along the underground route and studies in the US and Canada have generally said that proximity to transit increases property values. - Focus Group 2

A recent surge in the local home prices had severely limited housing availability, which quickly lead to changes in feature prioritizations of homebuyers. An influx of Toronto buyers, who had larger purchasing power, was described as the reason for the surge:

The last three listings I had were all bought by Toronto buyers, so that's just knowing that they're bidding the highest, because they're used to how much over you have to bid to get something; they're very aggressive. I mean our prices have up ticked 30% in 12 months. – Focus Group 1

Recent changes to mortgage lending rules in Canada and new taxes and policies aimed at curbing speculative home buying in Toronto were identified as central factors leading many Toronto residents and investors to consider the region as a viable alternative to Toronto:

The bank changed their lending rules. They changed the stress test so if you were able to afford, say a \$400,000 home, you better have bought before October, because now you can only afford a \$300,000 home because they're going to put a stress test of a different interest rate. They approve you for a 2.5% but they're going to stress test you on 2.8, so you can totally afford the \$400,000 home, but they're not going to allow you to purchase it, because of the stress test, so that's what did that first, and then everything came after it was everyone coming this way. – Focus Group 2

Also, an acknowledgement of how housing development often occurred in cycles depicted a need to consider the timing of when and how new projects came to market:

There needs to be more housing built and I think the developers and builders are working on it, but in the last six months, or maybe a little longer, everything that was more or less available has been purchased and now there's a bit of a lag in getting the next stuff, the next set of homes and developments online. – Focus Group 1

The macro-scale economic factors of currency exchange and immigration trends were also discussed by participants, as Canada and the region were viewed as positive locales for investment due to factors of stability and competitive exchange rates. While foreign ownership of property was considered to be a small percentage of overall ownership, trends of parents buying children housing for them to live in while they attended university, or immigrants seeing the region as an increasingly attractive alternative to Toronto for settlement were present:

We see a lot of Chinese who are buying around the universities... mostly for their kids... [They also buy], behind the scenes, commercial buildings. We're seeing Chinese people buying farms, so there's some of those other type of properties that aren't just residential; We're seeing foreign investment there, so I could see it being around 5% [foreign ownership] – Focus Group 5

Realtors depicted a wide array of economic processes that affect housing prices and which must be taken into account when considering LRT influences LVU, as many of these processes are localized depending on new resident or non-resident preference differences and the effects from federal and/or provincial policy or international economic processes.

5.6.5. City Image

The prestige of the region associated with the tech sector was described as a primary driver of the region's development. Realtors discussed how the tech and enterprise firms were locating in the region because of the prestige associated with the universities and the research they were involved with:

It's the Silicon Valley of Canada. The two: the knowledge industry, [the universities], the best community college in Canada... [and] the diverse economy (when one sector is up the other one is down, when the other one's down the other one's up). We have a knowledge-based industry, we have a strong economy, we have a high-tech sector, we have basically head offices of all the insurance companies here... - Focus Group 2

Participants saw the LRT as a representation of the region's forward thinking and commitment to maintaining its development as an internationally recognized locale:

[The LRT is] adding to credibility of this city and the Region for people looking in... If you're looking at tech, or relocating, or whatever you need to show a world class city... They're now thinking, five years ago... you wouldn't look at Waterloo and say 'oh wow, they've got a world class transportation system', whereas you might now think that.- Focus Group 1

The LRT was seen as adding to this perception of prestige, leading to comparisons of international locales:

If you look back at history or you look around the world, anywhere there has been a train system, whether its Delhi, Bombay, or the middle east, its

completely taken over the public transport system and its the backbone of the system. – Focus Group 4

These description of the LRT show the importance of the Region's image as fundamental aspect of creating a city that met with expectations of a technology center.

5.6.6. Municipal By-Laws

Greenfield development restrictions, development fee waivers, and pending rezoning of stations areas for development were described as motivating developer infill projects:

The region has a vested interest in allowing lots of builds on the LRT so that people use it, and not really doing much outside to expand the border of the cities because they want people using the LRT. So, they're going to be slow on releasing all these big developments in the suburbs. – Focus Group 4

The development of the ION LRT was juxtaposed to the concurrent development of the Ottawa LRT. Waterloo's implementation of an LRT as a precursor to development and Ottawa's implementation of an LRT as a reaction to development was discussed as being a central factor in the route and form decisions of each city's LRT:

When [concentrated condo] development happens, then LRT is a lot more critical, and a lot more necessary. And when we put it in now instead of after, there's a lot less people trying to get to the middle of the city right now than there would be once all of that development has happened; and then we're trying to build an LRT like Ottawa [where] they're digging under the city, because they can't put it on top. Whereas here what looks like we're putting it on top, then building around it – Focus Group 1

The difference of policies between the cities of the region were also noted as being an important consideration. Recent adoption of a rental licensing program instituted by the City of Waterloo was described as driving investment interest into the City of Kitchener as it placed an additional barrier on homeowners who were seeking to rent out their properties:

“When the Waterloo rental housing by-law comes in... someone from Toronto, their son or daughter was coming here they might buy an investment property, but now because of the rental housing by-law a lot of people started looking in Kitchener because it's easier [to rent housing]. – Focus Group 5

Realtors’ understanding of the ION LRT as a precursor to development reflects TOD research that positions urban rail station areas as mechanisms for encouraging development through zoning amendments. Subtle differences in urban form and complementary municipal by-laws were also described as influential dynamics that could affect LVU.

5.7. Discussion

5.7.1. Accessibility

5.7.1.1. Relative Accessibility

The prominence of automobiles in the RoW discussed by real estate agents during this research shows the importance of understanding how accessibility offered by LRT projects will only be as effective as it compares to other modes of transportation. The built environment effects of efficient highways and uncongested roads are likely to limit how readily residents will view an LRT system as a viable alternative. While these finding largely support Higgins and Kanaroglou’s findings, cultural and demographic perceptions of transportation options are likely to predispose population preferences, which may diminish the uptake of public transit opportunities, even when accessibility might otherwise be increased.

5.7.1.2. Population Accessibility Preferences

In the RoW, the congregation of new migrants, youth, and tech workers in the core areas and near LRT stations is likely to continue to drive the investment in station area development. Residents who will most likely occupy station areas will thus likely be from outside of the Region, or younger generations. This dynamic insinuates that the LRT is not being implemented for the current residents of the region, but for future residents who are attracted to higher density urban forms. This approach generally supports the Region’s goals to increase densities and shift away from the predominantly suburban, single detached home communities that dominate the Region.

The implementation of the LRT will likely result in a broader distribution of students throughout the Region, as their general reliance on public transportation conditions their possible

accessibility gains relative to other forms of travel. Despite a large amount of development occurring surrounding station areas, the negative perceptions associated with student housing are likely to limit future LVU gains of nearby properties. Controlling for the impacts of student populations will be critical in a region like Waterloo, where over 10% of the population is students.

Aging residents' desire to downsize into station areas to access amenities and services has been undermined by a lack of right-sized housing. This exclusion of aging residents likely impacts LVU negatively as many of them possess substantial home equity that could otherwise be reinvested in the station areas.

5.7.1.3. Low Income Concerns

Development occurring in station areas was generally depicted as displacing lower income residents through gentrification processes. Changes in accessibility for lower income residents associated with the development of the LRT is likely made invisible when calculating accessibility using sale prices, as low income residents will be far less likely to possess the capital required to purchase a home and will instead primarily be renters. If LRT studies are meant to represent the usefulness of projects for supporting residents, they need to clearly depict the barriers affecting residents of diverse socioeconomic backgrounds alongside the factors attracting residents to housing in station areas. Considering affordable/social housing availability by examining rental costs using hedonic models, like the one developed Pi, could allow a better understanding of how LRT projects are affecting residents from a broad range of economic situations (Pi, 2017).

5.7.1.4. Regional Accessibility

Accessibility is affected by macro-regional contexts, especially in urban environments that are relatively close to large cities. Commute times offered by commuter rail or highways (ex. the GO Train or 401) to other cities will affect the attractiveness of an urban environment, as people will be more likely consider connected communities as viable alternatives for housing. As train service between the RoW and Toronto is currently limited and lacking high speed service, tracking the LVU associated with announcements and implementation of a high-speed train service should be undertaken in the future.

5.7.1.5. Proximity Measures

According to Realtor estimations of station proximity desirability there is likely a range of willingness to walk. While the 800-meter standard is likely close to the average acceptable maximum distance, as Higgins and Kanaroglou point out, there is likely a log-linear relationship between proximity and LVU (Higgins & Kanaroglou, 2016a). The direct adjacency disamenity of stations and tracks due to noise and privacy concerns should also be investigated further.

Given the wide variance of amenity and service preferences that exists between different populations and within different station areas, using station proximity as a proxy for accessibility is likely failing to depict an accurate account of factors affecting LVU. In a region where long term residents prefer automobile travel supportive housing, and where core areas are most sought after by migrants, demographic preferences are important to consider as they likely represent submarkets that affect LVU in discrete ways.

5.7.2. Neighbourhood Quality

The variables operationalized in neighbourhood quality have complex relationships that differ based on homebuyer preference. As with accessibility, there is likely a large variance of preference between populations, which results in the emergence of submarkets. Thus, overgeneralizing buyer preference, especially in multicultural communities, can distort findings, as specific populations may have context-specific preferences.

Preferences of housing stock age and condition offer a particularly relevant example of how population perspectives may be affecting markets in unexpected ways. The rationale of concern for housing quality is highly dependent on which population is being considered. The immigrant preferences for new housing in the Region may be inflating the new home prices beyond what we might expect in a more homogenous region where construction methods are better known.

The process of self-selection that is leading to enclaving in communities is a further consideration, as the cultural amenities available will likely pull interest from particular groups related to school, religious institution, or lifestyle amenities. The enclaving process will likely reinforce the attractiveness of these amenities, which could then result in a compounding inflation of home prices. If school quality is a preferred measure of neighbourhood quality, which drives more affluent homebuyers to locate in the best districts, their preference will not only inflate the home prices of the area, but also quality of the school as education outcomes are much more closely related to household socioeconomic status than school quality. While the school quality effect is much more present in American than in Canadian municipalities, due to a difference in school funding models, it is still essential that such enclaving effects are controlled for.

5.7.3. Station Areas

The substantial emphasis placed on the downtown cores of the Region when discussing the LRT is indicative of a large variance between station area likeliness to experience LRT induced LVU. The close connection to home buyer preference, differing amenity access offered at each station, and the economic development patterns of the region was closely tied to a high desirability of core station areas. The cycle of development between station areas will likely vary drastically depending on tangential processes of development and municipal re-zoning efforts.

5.7.4. Economic Processes

Economic development underway within a city is a large determinant of the attractiveness of a neighbourhood, and thereby station area. While the tech sector accounts for a relatively small percentage of the Region's job market (~9%), the growth associated with it was depicted as a key motivating factor of LVU throughout the region (Region of Waterloo Planning Development and Legislative Services Community Planning, 2017). The depiction of downtown station areas as the most desirable for those in the tech sector predated the implementation of the LRT. Likewise, the continued success and growth of the post-secondary institutions has maintained the growth of the student population, which has resulted in a large increase in student housing developments. The nature of these developments' affect on LVU is uncertain, however, due to both the positive growth of student housing and the negative connotations associated with it. Failing to control for this population preference and development patterns could result in an over attribution of LVU to the LRT.

The context of larger provincial, federal, or world economic processes is a further important consideration. The mortgage lending rule and housing taxation changes that drove Toronto buyers into the RoW market occurred alongside the construction of the LRT. The

differences in preferences and available budget between populations such as Toronto and RoW buyers affected home prices and settlement patterns in an unprecedented manner.

5.7.5. City Image

The LRT's existence as a status symbol for the Region was seen as being able to attract migrants to the region who would appreciate the LRT and locate in areas that would help to develop lifestyle amenities that are commonly associated with rapid transit/world class cities. The general sense of pride associated with the project was expressed through the expectation of it to serve as an investment in the development of the regional economy. Thus, the future vision for the Region offered by the LRT was a cultural shift away from the long-held norms and mores of automobile dependence.

Investors understand the impact that rapid transit has on urban environments because of its effect on land values in other urban environments. The degree to which investors impact land values is, however, not generally considered external from home buyers in hedonic research. Investors place different values on housing attributes; however, as they purchase housing for equity, rather than as a home. If investors consider LRT proximity to be a positive attribute, they may also be behaving out of enclaving patterns, and thus inflating LVU.

5.7.6. Zoning By-Law Change

The connection between development patterns spreading from the core outwards and the process of rezoning undertaken by the municipalities likely structures the pattern and timing of LVU along LRT systems. The acknowledgement of how development is encouraged through zoning amendments depicted the critical role municipal governments play in LVU. Controlling for municipal zoning changes, which have either passed recently or are planned for, is essential

to isolate LRT LVU effects. The timing and nature of changes will, however, need to be closely considered, as updates to zoning by-laws often coincide with LRT project implementations.

The effects of other, non-zoning, bylaws are also an important consideration, especially in a region where multiple municipalities are in close proximity, such as Kitchener and Waterloo. The implementation of the rental housing licensing program in Waterloo pushed substantial investment into the Kitchener market, which likely had a large impact on the spatial distribution of LVU throughout the Region.

5.8. Conclusion

While rapid transit projects offer the potential of sustainable transportation and increased livability for a broad diversity of residents, care must be taken to accurately represent the effects they incur on the urban environment. This study depicts how hedonic modeling studies can benefit from the insights of qualitative research, which provides context for variable consideration and improved interpretation of results. When researching within heterogeneous societies it becomes essential to understand how differing population perspectives and regional trends interact. Rarely will a researcher's knowledge include all the cultural dynamics underway in a region, however, informants, such as the Realtors engaged in this study, can effectively fill in the gaps in an efficient manner.

This paper affirms the valuable insights of Higgins and Kanaroglou's contribution to improve future hedonic studies investigating LRT influenced LVU. Ensuring context appropriate variables are considered and operationalized according to local understandings will allow researchers to achieve more accurate and reliable findings. Building off the work of Neudorf (2014) and incorporating measures of travel time/cost to opportunities, as well as considering how opportunities and modes of travel are prioritized by heterogeneous populations, will provide

a more precise understanding of attribute prioritization. While this approach will likely complicate cross study comparability, examining LRT LVU as a log-linear attribute will likely aid in understanding the interconnection between differing opportunity bundles, and the dynamics of economic processes, city image, and zoning change. Longitudinal studies may assist with developing these understanding; however, studies would likely need to be undertaken from the moment project funding is approved until its full implementation is realized.

Finally, this study shows the importance of local perspectives in developing understandings of how LRT projects will affect a region. By understanding local development trends associated with LRT projects, such as the congregation patterns, or gentrification processes related to the ION LRT, research projects will provide more nuanced understandings of how individual lives are affected. Further, understanding local perspectives, such as the rationales behind preferences of long term RoW residents for single detached homes, can provide a basis for creating implementation plans that can better address resident housing needs and foster more diffuse behavioural change.

5.9. References

- Ala-mantila, S., Heinonen, J., & Junnila, S. (2013). Greenhouse Gas Implications of Urban Sprawl in the Helsinki Metropolitan Area. *Sustainability*, (5), 4461–4478. <https://doi.org/10.3390/su5104461>
- Alonso, W. (1964). *Location and Land Use; Toward a General Theory of Land Rent*. Cambridge: Harvard University Press.
- August, M., & Walks, A. (2017). Geoforum Gentrification, suburban decline, and the financialization of multi-family rental housing: The case of Toronto. *Geoforum*, (December 2016). <https://doi.org/10.1016/j.geoforum.2017.04.011>
- Belzer, D., & Autler, G. (2002). Transit Oriented Development: Moving From Rhetoric To Reality. *THE BROOKINGS INSTITUTION CENTER ON URBAN AND METROPOLITAN POLICY*, (November). Retrieved from <http://www.china-up.com:8080/international/case/case/810.pdf>
- Bierbaum, A. H., & Vincent, J. M. (2013). Putting Schools on the Map. *Transportation Research Record: Journal of the Transportation Research Board*, 2357(1), 77–85. <https://doi.org/10.3141/2357-09>
- Calthorpe, P. (1993). *The Next American Metropolis: Ecology, Community, and the American Dream*. Princeton Architectural Press. [https://doi.org/loc? not in merlin](https://doi.org/loc?not_in_merlin)
- Cao, J., & Ermagun, A. (2017). Influences of LRT on travel behaviour: A retrospective study on movers in Minneapolis. *Urban Studies*, 54(11), 2504–2520. <https://doi.org/10.1177/0042098016651569>
- Carlton, I. (2007). Histories of Transit-Oriented Development: Perspectives on the Development of the TOD Concept Real Estate and Transit, Urban and Social Movements, Concept Protagonist. *Institute of Urban and Regional Development University of California, Berkeley*.
- Cervero, R. (2007). Transit-oriented development's ridership bonus: a product of self-selection and public policies. *Environment and Planning A*, 39, 2068–2085.
- Cervero, R., & Duncan, M. (2002). Transit's Value-Added Effects: Light and Commuter Rail Services and Commercial Land Values. *Transportation Research Record: Journal of the Transportation Research Board*, (1805), 8–15. <https://doi.org/10.3141/1805-02>
- Cervero, R., & Sullivan, C. (2011). Green TODs: marrying transit-oriented development and green urbanism. *International Journal of Sustainable Development & World Ecology*, 18(3), 210–218. <https://doi.org/10.1080/13504509.2011.570801>
- Condon, P. M., Gruenberger, S., & Klaptocz, M. (2008). The Case for the Tram: Learning from Portland. *Foundational*, 6, 933–5. <https://doi.org/10.2217/fon.11.85>
- Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. *Research design Qualitative quantitative and mixed methods approaches*. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Douglas, G. C. C. (2010). Rail Transit Identification and Neighbourhood Identity. Exploring the Potential for 'Community-Supportive Transit.' *Journal of Urban Design*, 15(2), 175–193.

<https://doi.org/10.1080/13574801003638020>

- Ferbrache, F., & Knowles, R. (2016). Generating opportunities for city sustainability through investments in light rail systems: Introduction to the Special Section on light rail and urban sustainability. *Journal of Transport Geography*, 54, 369–372.
<https://doi.org/10.1016/j.jtrangeo.2016.06.004>
- Ferbrache, F., & Knowles, R. (2017). City boosterism and place-making with light rail transit: A critical review of light rail impacts on city image and quality. *Geoforum*, 80, 103–113.
<https://doi.org/10.1016/j.geoforum.2017.01.013>
- Florida, R. (2005). *Cities and the Creative Class*. New York: Routledge.
<https://doi.org/10.1177/0739456X9901900202>
- Florida, R. (2017). *The new urban crisis : how our cities are increasing inequality, deepening segregation, and failing the middle class-- and what we can do about it*. New York: Basic Books.
- Freilich, R. H., & Sitkowski, Robert J. Mennillo, S. D. (2010). *From sprawl to sustainability : smart growth, new urbanism, green development, and renewable energy*. Chicago: American Bar Association.
- Furberg, D., & Ban, Y. (2012). Satellite monitoring of Urban sprawl and assessment of its potential environmental impact in the Greater Toronto Area between 1985 and 2005. *Environmental Management*, 50(6), 1068–1088. <https://doi.org/10.1007/s00267-012-9944-0>
- Georgescu, M., Morefield, P. E., Bierwagen, B. G., & Weaver, C. P. (2014). Urban adaptation can roll back warming of emerging megapolitan regions. *Proceedings of the National Academy of Sciences*, 111(8), 2909–2914. <https://doi.org/10.1073/pnas.1322280111>
- Given, L. M. (2012). Explanatory Research. *The SAGE Encyclopedia of Qualitative Research Methods*, 324–325.
- Government of Ontario. Places to Grow Act, 2005 (2005).
- Government of Ontario. (2017). Growth Plan for the Greater Golden Horseshoe (2017), 1–120.
- Grant, J. (2006). The ironies of new urbanism. *Canadian Journal of Urban Research*.
<https://doi.org/10.1227/00006123-197907010-00120>
- Grant, J., & Bohdanow, S. (2008). New urbanism developments in Canada: A survey. *Journal of Urbanism*, 1(2), 109–127. <https://doi.org/10.1080/17549170802221435>
- Grant, J. L. (2009). Theory and practice in planning the suburbs: Challenges to implementing new urbanism, smart growth, and sustainability principles. *Planning Theory and Practice*, 10(1), 11–33. <https://doi.org/10.1080/14649350802661683>
- Handy, S. (2005). Smart growth and the transportation-land use connection: What does the research tell us? *International Regional Science Review*, 28(2), 146–167.
<https://doi.org/10.1177/0160017604273626>
- Hess, D. B., & Almeida, T. M. (2007). Impact of Proximity to Light Rail Rapid Transit on Station-area Property Values in Buffalo , New York. *Urban Studies*, 44(5), 1041–1068.
- Higgins, C., Ferguson, M., & Kanaroglou, P. (2014). Light Rail and Land Use Change : Rail Transit ’ s Role in Reshaping and Revitalizing Cities. *Journal of Public Transportation*,

17(2), 93–112. <https://doi.org/10.5038/2375-0901.17.2.5>

- Higgins, C., & Kanaroglou, P. (2016a). Forty years of modelling rapid transit's land value uplift in North America: moving beyond the tip of the iceberg. *Transport Reviews*, 36(5), 610–634. <https://doi.org/10.1080/01441647.2016.1174748>
- Higgins, C., & Kanaroglou, P. (2016b). Infrastructure or Attraction? Image-led Planning and the Intangible Objectives of Rapid Transit Projects. *Journal of Planning Literature*, 31(4), 452–462. <https://doi.org/10.1177/0885412216667899>
- Higgins, C., & Kanaroglou, P. (2017). Rapid transit , transit-oriented development , and the contextual sensitivity of land value uplift in Toronto, (May 2016). <https://doi.org/10.1177/0042098017712680>
- Hong, A., Boarnet, M. G., & Houston, D. (2016). New light rail transit and active travel: A longitudinal study. *Transportation Research Part A: Policy and Practice*, 92, 131–144. <https://doi.org/10.1016/j.tra.2016.07.005>
- Hurst, N. B., & West, S. E. (2014). Public transit and urban redevelopment: The effect of light rail transit on land use in Minneapolis, Minnesota. *Regional Science and Urban Economics*, 46(1), 57–72. <https://doi.org/10.1016/j.regsciurbeco.2014.02.002>
- Infrastructure Canada. (2018). Building Strong Cities Through Investments in Public Transit. Retrieved from <https://www.infrastructure.gc.ca/plan/ptif-fitc-eng.php>
- Jones, C. E., & Ley, D. (2016). Transit-oriented development and gentrification along Metro Vancouver's low-income SkyTrain corridor. *Canadian Geographer*, 60(1), 9–22. <https://doi.org/10.1111/cag.12256>
- Knowles, R., & Ferbrache, F. (2014). An Investigation into the Economic Impacts on Cities of Investment in Light Rail Systems. Knowles, R., & Ferbrache, F. (2014). *An Investigation into the Economic Impacts on Cities of Investment in Light Rail Systems*, (June), 100., (June), 100.
- Knowles, R., & Ferbrache, F. (2016). Evaluation of wider economic impacts of light rail investment on cities. *Journal of Transport Geography*, 54, 430–439. <https://doi.org/10.1016/j.jtrangeo.2015.09.002>
- Kuminoff, N. V., Parmeter, C. F., & Pope, J. C. (2010). Which hedonic models can we trust to recover the marginal willingness to pay for environmental amenities? *Journal of Environmental Economics and Management*, 60(3), 145–160. <https://doi.org/10.1016/j.jeem.2010.06.001>
- Lancaster, K. J. (1966). A New Approach to Consumer Theory. *Journal of Political Economy*, 74(2), 132–157.
- Lee, J., Choi, K., & Leem, Y. (2016). Bicycle-based transit-oriented development as an alternative to overcome the criticisms of the conventional transit-oriented development. *International Journal of Sustainable Transportation*, 10(10), 975–984. <https://doi.org/10.1080/15568318.2014.923547>
- Lee, S., & Lee, B. (2014). The influence of urban form on GHG emissions in the U.S. household sector. *Energy Policy*, 68, 534–549. <https://doi.org/10.1016/j.enpol.2014.01.024>

- Litman, T. (2007). Evaluating rail transit benefits: A comment. *Transport Policy*, 14(1), 94–97. <https://doi.org/10.1016/j.tranpol.2006.09.003>
- Litman, T. (2012a). Community Cohesion As A Transport Planning Objective. *Victoria Transport Policy Institute*, (February), 1–22. <https://doi.org/10.1001/archpsyc.63.7.757>
- Litman, T. (2012b). Evaluating Transportation Economic Development Impacts. *Victoria Transport Policy Institute*.
- Liu, X., Deng, Y., & Le Vine, S. (2016). Residential relocation in response to light rail transit investment: case study of the Hudson–Bergen Light Rail system. *Journal of Modern Transportation*, 24(2), 139–144. <https://doi.org/10.1007/s40534-016-0100-z>
- McIntosh, J. R. (2015). Framework for land value capture from investments in transit in car-dependent cities. *Journal of Transport and Land Use*, 155–185. <https://doi.org/10.5198/jtlu.2015.531>
- Modarres, A. L. I. (2011). Polycentricity , Commuting Pattern , Urban Form : The Case of Southern California, 35(November), 1193–1211. <https://doi.org/10.1111/j.1468-2427.2010.00994.x>
- Mohammad, S. I., Graham, D. J., Melo, P. C., & Anderson, R. J. (2013). A meta-analysis of the impact of rail projects on land and property values. *Transportation Research Part A: Policy and Practice*, 50, 158–170. <https://doi.org/10.1016/j.tra.2013.01.013>
- Moos, M., Vinodrai, T., Revington, N., & Seasons, M. (2018). Planning for Mixed Use: Affordable for Whom? *Journal of the American Planning Association*, 84(1), 7–20. <https://doi.org/10.1080/01944363.2017.1406315>
- Morais, R. J. (2010). *Refocusing Focus Groups: A Practical Guide*. Ithana: Paramount Market Publishing, Inc.
- Morgan, D. L. (1998). *The Focus Group Guidebook*. Thousand Oaks: Sage Publications, Inc.
- Mueller, E. J., Hilde, T. W., & Torrado, M. J. (2018). Methods for countering spatial inequality: Incorporating strategic opportunities for housing preservation into transit-oriented development planning. *Landscape and Urban Planning*, 177(September 2017), 317–327. <https://doi.org/10.1016/j.landurbplan.2018.01.003>
- Muth, J. F. (1969). *Cities and housing : the spatial pattern of urban residential land use*. Chicago: University of Chicago Press.
- Nahlik, M. J., & Chester, M. V. (2014). Transit-oriented smart growth can reduce life-cycle environmental impacts and household costs in Los Angeles. *Transport Policy*, 35, 21–30. <https://doi.org/10.1016/j.tranpol.2014.05.004>
- Nazarnia, N., Schwick, C., & Jaeger, J. A. G. (2016). Accelerated urban sprawl in Montreal , Quebec City , and Zurich : Investigating the differences using time series 1951 – 2011, 60, 1229–1251.
- Nechyba, T. J., & Walsh, R. P. (2004). Urban Sprawl. *Journal of Economic Perspectives*, 18(4), 177–200. <https://doi.org/10.1257/0895330042632681>
- Neudorf, J. (2014). *Understanding Accessibility , Analyzing Policy : New Approaches for a New Paradigm by*. University of Waterloo.

- Páez, A., Scott, D. M., & Morency, C. (2012). Measuring accessibility: Positive and normative implementations of various accessibility indicators. *Journal of Transport Geography*, 25, 141–153. <https://doi.org/10.1016/j.jtrangeo.2012.03.016>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Pan, H., Li, J., Shen, Q., & Shi, C. (2017). What determines rail transit passenger volume? Implications for transit oriented development planning. *Transportation Research Part D: Transport and Environment*, 57(September), 52–63. <https://doi.org/10.1016/j.trd.2017.09.016>
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: integrating theory and practice*. Thousand Oaks, California: SAGE.
- Pi, X. (2017). Exploring Rental Housing Market in Kitchener-Waterloo, Ontario. <https://doi.org/http://hdl.handle.net/10012/12431>
- Piore, M. J. (2006). Qualitative research: does it fit in economics? *European Management Review*, 3, 17–23. Retrieved from doi:10.1057/palgrave.emr.1500053
- Plays, T., & Atchison, C. (2008). *Research Decisions: Quantitative and Qualitative Perspectives, Fourth Edition*. Toronto: Nelson.
- Procter, A., Bassi, A., Kolling, J., Cox, L., Flanders, N., Tanners, N., & Araujo, R. (2017). The effectiveness of Light Rail transit in achieving regional CO2 emissions targets is linked to building energy use: insights from system dynamics modeling. *Clean Technologies and Environmental Policy*, 19(5), 1459–1474. <https://doi.org/10.1007/s10098-017-1343-z>
- Qviström, M. (2015). Putting accessibility in place: A relational reading of accessibility in policies for transit-oriented development. *Geoforum*, 58, 166–173. <https://doi.org/10.1016/j.geoforum.2014.11.007>
- Ratner, K. A., & Goetz, A. R. (2013). The reshaping of land use and urban form in Denver through transit-oriented development. *Cities*, 30(1), 31–46. <https://doi.org/10.1016/j.cities.2012.08.007>
- Region of Waterloo. (2018). *Year-End 2017 Population and Household Estimates for Waterloo Region*.
- Region of Waterloo Planning Development and Legislative Services Community Planning. (2016). *ION Story*. Region of Waterloo.
- Region of Waterloo Planning Development and Legislative Services Community Planning. (2017). *2016 Labour Force Report*.
- Renne, J. L., Tolford, T., Hamidi, S., & Ewing, R. (2016). The Cost and Affordability Paradox of Transit-Oriented Development: A Comparison of Housing and Transportation Costs Across Transit-Oriented Development, Hybrid and Transit-Adjacent Development Station Typologies. *Housing Policy Debate*, 26(4–5), 819–834. <https://doi.org/10.1080/10511482.2016.1193038>

- Revington, N., & Townsend, C. (2016). Market Rental Housing Affordability and Rapid Transit Catchments: Application of a New Measure in Canada. *Housing Policy Debate*, 1482(March), 1–23. <https://doi.org/10.1080/10511482.2015.1096805>
- Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, 82(1), 34–55. <https://doi.org/10.1086/260169>
- Sirmans, G. S., Macpherson, D. A., & Zietz, E. N. (2005). The Composition of Hedonic Pricing Models. *Journal of Real Estate Literature*, 13(1), 3–43. <https://doi.org/Article>
- Sorensen, A. (1999). Land Readjustment, Urban Planning and Urban Sprawl in the Tokyo Metropolitan Area. *Urban Studies*, 36(13), 2333–2360. <https://doi.org/10.1080/0042098992458>
- Stake, R. E. (1995). *The art of case study research*. SAGE.
- Stewart, D. W., Shamdasani, P. N., & Rook, D. W. (2007). *Focus Groups: Theory and Practice*. Thousand Oaks: Sage Publications, Inc.
- Stopher, P. R. (2004). Reducing road congestion: A reality check. *Transport Policy*, 11(2), 117–131. <https://doi.org/10.1016/j.tranpol.2003.09.002>
- Styśko-Kunkowska, M. (2014). *Interviews as a qualitative research method in management and economics sciences*. Warsaw: World Economy at Warsaw School of Economics.
- Tayarani, M., Poorfakhraei, A., Nadafianshamabadi, R., & Rowangould, G. M. (2016). Evaluating unintended outcomes of regional smart-growth strategies: Environmental justice and public health concerns. *Transportation Research Part D: Transport and Environment*, 49, 280–290. <https://doi.org/10.1016/j.trd.2016.10.011>
- Taylor, B. D. (2004). The politics of congestion mitigation. *Transport Policy*, 11(3), 299–302. <https://doi.org/10.1016/j.tranpol.2004.04.001>
- Thomas, R., & Bertolini, L. (2014). Beyond the Case Study Dilemma in Urban Planning: Using a Meta-matrix to Distil Critical Success Factors in Transit-Oriented Development. *Urban Policy and Research*. Taylor & Francis. <https://doi.org/10.1080/08111146.2014.882256>
- Topalovic, P., Carter, J., Topalovic, M., & Krantzberg, G. (2012). Light Rail Transit in Hamilton: Health, Environmental and Economic Impact Analysis. *Social Indicators Research*, 108(2), 329–350. <https://doi.org/10.1007/s11205-012-0069-x>
- Trost, S. G., Kerr, L. M., Ward, D. S., & Pate, R. R. (2001). Physical activity and determinants of physical activity in obese and non-obese children. *International Journal of Obesity*, 25(6), 822–829. <https://doi.org/10.1038/sj.ijo.0801621>
- Trudeau, D. (2013). New Urbanism as Sustainable Development? *Geography Compass*, 7(6), 435–448. <https://doi.org/10.1111/gec3.12042>
- van Lierop, D., Maat, K., & El-Geneidy, A. (2017). Talking TOD: learning about transit-oriented development in the United States, Canada, and the Netherlands. *Journal of Urbanism*, 10(1), 49–62. <https://doi.org/10.1080/17549175.2016.1192558>
- Villasenor, N. R., Tulloch, A. I. T., Driscoll, D. A., Gibbons, P., & Lindenmayer, D. B. (2017). Compact development minimizes the impacts of urban growth on native mammals. *Journal of Applied Ecology*, (54), 794–804. <https://doi.org/10.1111/1365-2664.12800>

Wallace, A. (2004). Understanding Local Housing Markets ? The need for a complementary institutional approach Understanding Local Housing Markets ? The need for a complementary institutional approach . *Centre for Housing Policy*.

Willcocks, C. A. (2011). *Encouraging Family-Friendly Condominium Development and Creating Complete Communities in Downtown Toronto*. University of Waterloo.

Yin, C., Yuan, M., Lu, Y., Huang, Y., & Liu, Y. (2018). Effects of urban form on the urban heat island effect based on spatial regression model. *Science of the Total Environment*, 634, 696–704. <https://doi.org/10.1016/j.scitotenv.2018.03.350>

Chapter 6: Discussion and Conclusions: Research Findings and Recommendations

The following chapter contextualizes the findings of both manuscripts presented in this thesis within the broader scope of TOD research and policy. The discussion presented situates the findings within prevailing TOD literature and considers how they affirm, or dispute, contemporary understandings of how urban rail affects urban environments. The discussion forms the basis for the subsequently presented future research and policy recommendations.

6.1. Discussion

Real estate agents attributed significant economic development to how the ION LRT affected perceptions of the neighbourhoods surrounding station areas. These perceptions served as symbols of where future development would occur, which were subsequently perceived as a driver for investment in station areas from development firms, businesses and independent investors from across the country.

Participant perspectives of the ION LRT are consistent with prevailing critiques of TOD, which consider it a mechanism for economic development, realized by its ability to reshape urban forms through zoning amendments. By anticipating and, in some instances, actively investing or promoting development in station areas, real estate agents assumed that future zoning amendments would allow high density development in station areas. As the ION LRT was positioned as a means of promoting urban change, it was understood as a land use planning mechanism first and foremost.

The importance placed on supporting the continued expansion of the tech hubs and university campuses of the Region, as a means of stimulating employment growth, was also seen as a central benefit of the LRT. The continued references of how the LRT was a key

implementation for establishing the Region as “world class” were particularly instructive. These descriptions depicted the LRT as a symbol of creative cities that would result in attracting business and employees who are generally defined as representative of the creative class. This focus is largely consistent with creative class theory literature, in which cities are increasingly seen as competing with each other to attract creative class residents and employers (Florida, 2017).

Most residential development occurring along the CTC was described as targeting creative class individuals, who sought high density neighbourhoods that offered a wide range of amenities. As such, the lack of appeal to long term residents suggests there will not be significant shifts in travel behaviour throughout the region, beyond shifts resulting from immigration patterns. While inter-generational shifts may occur that attract more young residents into the CTC, as residents are offered more choice in housing and transportation options, the present dynamic seems to be creating a cultural divide between in-CTC and out-CTC residents. As economic development efforts focus on creative class job creation and lifestyles, this divide has the potential to disenfranchise out-CTC residents in the absence of efforts to ensure economic development and encouraging behaviour change of all residents occurs throughout the Region.

The lack of accessible and affordable housing in station areas and processes of gentrification resulting from the implementation of the LRT were reflected by participants as an intrinsic part of the implementation process. This deprivation of accessibility to the LRT and station area amenities from low income residents was generally understood as fallout from developing with the creative class in mind. Real estate agents, however, were concerned by these effects and stressed the importance of ensuring that equitable and inclusive accessibility to services and urban amenities was maintained for residents throughout the region. The concern expressed by

real estate agents depicts a diffuse understanding of the negative impacts associated with gentrification processes.

The importance of extra-regional rapid transit connections stressed by participants is indicative of TOD and creative class theories that stress the need for connections across large scale mega-regions. The extent to which inter-regional and extra-regional transit are understood as complementary *and* independently important by participant real estate agents demonstrates a diffuse knowledge of TOD approaches and creative cities theories among real estate agents and throughout the general population.

Likewise, the discussion surrounding the image of each city and the Region as a whole reflected place-making and branding theories of how places develop identity. Discussions of the Region becoming a creative class center were highly indicative of this process; however, station area identity was also discussed as undergoing this process, often in a more nuanced manner. Depictions of student housing, the tech hubs, and the downtown cores showed how each neighbourhood's identity emerged in relation to the process of development and congregation patterns.

Neighbourhood identities were also discussed as potentially affecting housing prices, and by extension LVU, through positive or negative connotations that were applied either without a factual basis, or due to questionable biases. This effect was most readily described during discussions of school quality, and the use of a central school ranking system to determine neighbourhood quality by homebuyers. Neighbourhood identity effects were also discussed as based on neighbourhood demographics (i.e. students, low income residents), or at the city scale with Waterloo represented as “white collar”, Kitchener represented as “blue collar”, and a

general lack of representation for Cambridge, which was considered separate and a commuter city.

6.2. Future Research Recommendations

This study has filled gaps in understanding how local knowledge and perceptions likely affect the behaviour change and economic development associated with the implementation of urban rail infrastructure. Ensuring that qualitative methods are more frequently used while developing understandings of local perspective will likely heighten future hedonic studies' precision while analysing data. For instance, using resident perspectives to reconsider how accessibility is defined and operationalized can likely produce a better depiction of how changes to transportation will alter resident behaviour. Similarly, integrating the potential of multi-market perspectives into hedonic studies, rather than treating housing as a unified market could help to better understand how LVU occurs in non-homogenous areas. Considering multi-market scenarios in terms of both demographics and housing type may reveal differing relationships between LVU and TOD. The combination of sub-market and accessibility considerations is also likely to be useful in hedonic study analysis, as which opportunities are preferred by particular demographics and residents of different housing types is likely to have a high degree of variation.

Similar to Higgins and Kanaroglou's findings that LVU is station area and typology dependent, this study showed a stronger pull from TOD oriented amenities and services in a walking distance than the pull from the transit services themselves. Additional research on these dynamics including considerations of the interplay between demographics and housing type is likely to provide additional depth of understandings of spatial impacts on LVU. Integrating temporal effects that consider how station area accessibility changes over time and in response to

demographic shifts, as additional amenities are created in response to station area development, is also likely to yield increased understandings of how LVU and behaviour change occurs.

The nature and effects of investment related to urban rail infrastructure was discussed as potentially affecting LVU; however, the investor's role or the magnitude of impact they have on LVU remains unclear. Real estate agent comments depicted most investors as being from the Region or Canadian residents, rather than foreign investors. Instead of being derived from investor location attributes, investor class typologies were described as shaping investor housing attribute preferences. Research exploring how investor behaviour differs from personal-use homebuyers has the potential to reveal additional sub markets or factors that motivate LVU, as investor considerations are likely unique.

The processes of cultural development associated with TOD that emerged during this research also offer potential insights of how LRT influenced behaviour change occurs or is resisted. Anthropological methodologies may be particularly useful to planners and researchers for uncovering how cultures interact with transit infrastructure, as they are able to develop deep understandings of how individuals' perspectives are formed and interact with surrounding environments. Better understandings of the cultural reactions to TOD, and the resulting processes of acceptance or dismissal, carry the potential to implement TOD alongside programs that can result in greater acceptance, behaviour change, and result in more sustainable urban environments.

6.3. Policy Recommendations

Using TOD as a mechanism for instituting increased density zoning amendments may be a meaningful approach, as urban rail serves as a symbol of increased density and can indicate that zoning changes and density increases will occur in station areas.

1. Allocating additional funding from federal, provincial and municipal governments for urban rail infrastructure and associated zoning amendments can likely encourage densification of urban areas much more readily than possible by applying density targets or growth boundaries.
2. Penetrating urban rail systems, especially LRT, into suburban communities could offer an effective means of encouraging infill and higher densities throughout a region. This approach could simultaneously offer increased accessibility to residents and provide opportunities to change their travel behaviours, while diminishing political polarization incurred by focusing TOD only in core areas.

Without clear and standardized definitions of TOD, comparing projects, station areas, and neighbourhoods remains difficult. Scrutiny of projects that purport to be TOD but that lack access to transit and incur negative impacts on VMT reflect the need to codify TOD specifications more clearly. Likewise, the trend of building urban rail projects in core areas likely reinforces pre-existing development expectations, rather than defying urban development norms.

1. Municipalities can likely capitalize on zoning bylaw amendments to encourage behaviour change through high density, mixed-use, urban form in communities that lack urban rail if zoning occurs as infill and mirrors the design standards used in core areas.

2. Creating policies that encourage long term residents to use LRT, such as discounted fares based on length of residency in the Region, may be a particularly impactful means of overcoming behaviour change resistance.

Ensuring that TOD occurs with families and aging residents in mind requires appropriate housing availability in high density constructions. Multigenerational supportive regulations would likely have a dual effect of providing families and aging residents with more options while also exposing youth to public transportation, normalizing it the process.

1. Enacting policies that require two, three, four, and/or five bedroom units are included in new constructions within station areas will provide opportunities for households with varying need to have access to urban rail systems.
2. Requiring that family and aging resident perspectives are included during community and building design processes will help ensure generation specific needs are met by TOD, such as open space, childcare, or age friendly community design.

Protecting low income residents' ability to remain in place is essential to protect against the gentrification effects of TOD and its pursuit of the creative class. Given how gentrification processes are generally understood as attached to TOD development projects, and were decried by real estate agent participants, it is unlikely that measures aimed at offsetting gentrification will be met with substantial resistance.

1. Developing the stock of social housing units within station areas will help those most in need and most likely to benefit from access to urban rail systems.

2. Ensuring Provincial rent control legislation is maintained or enhanced will impede landlords and developers from instituting sudden rent hikes, which can make units unaffordable for current residents.
3. Instituting incentives aimed at increasing the stock of affordable housing may increase the number of non-luxury units produced within station areas. These incentives will likely require careful analysis of building practice to deduce particular designs and construction methods that produce the most affordable housing units.

While enclaving effects may result in negative consequences that need to be mitigated, these effects could also be leveraged to create positive outcomes for communities.

1. Providing additional funds to schools that lack parental support networks may mitigate negative school catchment area perceptions and result in a more even distribution of family income throughout a region.
2. Government support for creating culturally specific neighbourhood identities may assist communities by creating positive environments that can better capitalize on the social support networks of ethnic enclaves.
3. Municipal programs that require widespread adoption of age-friendly community principals, especially in TODs, could create opportunities for downsizing residents to relocate into broader range of communities.

6.4. Conclusion

Cities are approaching TOD as a mechanism for economic development first and foremost, and as a means of producing good places to live, from sustainable, cultural, and equitable viewpoints, second. This understanding was reflected by real estate agent participant

perspectives, that indicated how the LRT was understood as a motivator of property investment and employer attraction. Resident's latent understandings of the ION LRT station areas as sites of future development positions the project as an effort to confront/combat NIMBYism by serving as a mechanism for incentivising zoning regulation amendments. This approach limits development focus to core areas, however, while ignoring the prevailing land-uses of suburban housing.

While effective, the transit aspects of TOD may be superfluous as the enactment of zoning amendments may yield similar economic development results if subsequent accessibility is increased and neighbourhoods maintain high density urban form design guidelines. TOD may, however, not be effective at reshaping land-use patterns at the macro or meso scales, as most Canadian residents will maintain housing preferences shaped by their childhood experience and parent's urban form preferences. Trends of younger generations living in core area apartments may persist due to housing affordability and availability concerns; however, without viable options for them to transition into multi-generational friendly TOD housing, they will likely migrate to suburban housing. Similarly, low income residents would likely fall victim to gentrification effects without specific provisions to ensure both social and affordable housing is available within infill station areas.

TOD can likely be effective at addressing environmental and global warming concerns, fostering economic development, and providing inclusive and affordable housing if urban rail projects receive adequate funding and policies are created to ensure all the core tenants of TOD are incorporated into projects. While the ION LRT represent a step in the right direction for Canadian communities, a concerted commitment and effort from all levels of government and

the planning community will be required to realize these goals and ensure an equitable and sustainable future for our cities.

References

- Ala-mantila, S., Heinonen, J., & Junnila, S. (2013). Greenhouse Gas Implications of Urban Sprawl in the Helsinki Metropolitan Area. *Sustainability*, (5), 4461–4478. <https://doi.org/10.3390/su5104461>
- Alonso, W. (1964). *Location and Land Use; Toward a General Theory of Land Rent*. Cambridge: Harvard University Press.
- August, M., & Walks, A. (2017). Geoforum Gentrification, suburban decline, and the financialization of multi-family rental housing: The case of Toronto. *Geoforum*, (December 2016). <https://doi.org/10.1016/j.geoforum.2017.04.011>
- Belzer, D., & Autler, G. (2002). Transit Oriented Development: Moving From Rhetoric To Reality. *THE BROOKINGS INSTITUTION CENTER ON URBAN AND METROPOLITAN POLICY*, (November). Retrieved from <http://www.china-up.com:8080/international/case/case/810.pdf>
- Bierbaum, A. H., & Vincent, J. M. (2013). Putting Schools on the Map. *Transportation Research Record: Journal of the Transportation Research Board*, 2357(1), 77–85. <https://doi.org/10.3141/2357-09>
- Calthorpe, P. (1993). *The Next American Metropolis: Ecology, Community, and the American Dream*. Princeton Architectural Press. [https://doi.org/loc? not in merlin](https://doi.org/loc?not_in_merlin)
- Cao, J., & Ermagun, A. (2017). Influences of LRT on travel behaviour: A retrospective study on movers in Minneapolis. *Urban Studies*, 54(11), 2504–2520. <https://doi.org/10.1177/0042098016651569>
- Carlton, I. (2007). Histories of Transit-Oriented Development: Perspectives on the Development of the TOD Concept Real Estate and Transit, Urban and Social Movements, Concept Protagonist. *Institute of Urban and Regional Development University of California, Berkeley*.
- Cervero, R. (2007). Transit-oriented development's ridership bonus: a product of self-selection and public policies. *Environment and Planning A*, 39, 2068–2085.
- Cervero, R., & Duncan, M. (2002). Transit's Value-Added Effects: Light and Commuter Rail Services and Commercial Land Values. *Transportation Research Record: Journal of the Transportation Research Board*, (1805), 8–15. <https://doi.org/10.3141/1805-02>
- Cervero, R., & Sullivan, C. (2011). Green TODs: marrying transit-oriented development and green urbanism. *International Journal of Sustainable Development & World Ecology*, 18(3), 210–218. <https://doi.org/10.1080/13504509.2011.570801>
- Condon, P. M., Gruenberger, S., & Klaptocz, M. (2008). The Case for the Tram: Learning from Portland. *Foundational*, 6, 933–5. <https://doi.org/10.2217/fon.11.85>
- Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. *Research design Qualitative quantitative and mixed methods approaches*. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Douglas, G. C. C. (2010). Rail Transit Identification and Neighbourhood Identity. Exploring the

- Potential for ‘Community-Supportive Transit.’ *Journal of Urban Design*, 15(2), 175–193.
<https://doi.org/10.1080/13574801003638020>
- Ferbrache, F., & Knowles, R. (2016). Generating opportunities for city sustainability through investments in light rail systems: Introduction to the Special Section on light rail and urban sustainability. *Journal of Transport Geography*, 54, 369–372.
<https://doi.org/10.1016/j.jtrangeo.2016.06.004>
- Ferbrache, F., & Knowles, R. (2017). City boosterism and place-making with light rail transit: A critical review of light rail impacts on city image and quality. *Geoforum*, 80, 103–113.
<https://doi.org/10.1016/j.geoforum.2017.01.013>
- Florida, R. (2005). *Cities and the Creative Class*. New York: Routledge.
<https://doi.org/10.1177/0739456X9901900202>
- Florida, R. (2017). *The new urban crisis : how our cities are increasing inequality, deepening segregation, and failing the middle class-- and what we can do about it*. New York: Basic Books.
- Freilich, R. H., & Sitkowski, Robert J. Mennillo, S. D. (2010). *From sprawl to sustainability : smart growth, new urbanism, green development, and renewable energy*. Chicago: American Bar Association.
- Furberg, D., & Ban, Y. (2012). Satellite monitoring of Urban sprawl and assessment of its potential environmental impact in the Greater Toronto Area between 1985 and 2005. *Environmental Management*, 50(6), 1068–1088. <https://doi.org/10.1007/s00267-012-9944-0>
- Georgescu, M., Morefield, P. E., Bierwagen, B. G., & Weaver, C. P. (2014). Urban adaptation can roll back warming of emerging megapolitan regions. *Proceedings of the National Academy of Sciences*, 111(8), 2909–2914. <https://doi.org/10.1073/pnas.1322280111>
- Given, L. M. (2012). Explanatory Research. *The SAGE Encyclopedia of Qualitative Research Methods*, 324–325.
- Government of Ontario. Places to Grow Act, 2005 (2005).
- Government of Ontario. (2017). Growth Plan for the Greater Golden Horseshoe (2017), 1–120.
- Grant, J. (2006). The ironies of new urbanism. *Canadian Journal of Urban Research*.
<https://doi.org/10.1227/00006123-197907010-00120>
- Grant, J., & Bohdanow, S. (2008). New urbanism developments in Canada: A survey. *Journal of Urbanism*, 1(2), 109–127. <https://doi.org/10.1080/17549170802221435>
- Grant, J. L. (2009). Theory and practice in planning the suburbs: Challenges to implementing new urbanism, smart growth, and sustainability principles. *Planning Theory and Practice*, 10(1), 11–33. <https://doi.org/10.1080/14649350802661683>
- Handy, S. (2005). Smart growth and the transportation-land use connection: What does the research tell us? *International Regional Science Review*, 28(2), 146–167.
<https://doi.org/10.1177/0160017604273626>
- Hess, D. B., & Almeida, T. M. (2007). Impact of Proximity to Light Rail Rapid Transit on Station-area Property Values in Buffalo , New York. *Urban Studies*, 44(5), 1041–1068.
- Higgins, C., Ferguson, M., & Kanaroglou, P. (2014). Light Rail and Land Use Change : Rail

- Transit's Role in Reshaping and Revitalizing Cities. *Journal of Public Transportation*, 17(2), 93–112. <https://doi.org/10.5038/2375-0901.17.2.5>
- Higgins, C., & Kanaroglou, P. (2016a). Forty years of modelling rapid transit's land value uplift in North America: moving beyond the tip of the iceberg. *Transport Reviews*, 36(5), 610–634. <https://doi.org/10.1080/01441647.2016.1174748>
- Higgins, C., & Kanaroglou, P. (2016b). Infrastructure or Attraction? Image-led Planning and the Intangible Objectives of Rapid Transit Projects. *Journal of Planning Literature*, 31(4), 452–462. <https://doi.org/10.1177/0885412216667899>
- Higgins, C., & Kanaroglou, P. (2017). Rapid transit, transit-oriented development, and the contextual sensitivity of land value uplift in Toronto, (May 2016). <https://doi.org/10.1177/0042098017712680>
- Hong, A., Boarnet, M. G., & Houston, D. (2016). New light rail transit and active travel: A longitudinal study. *Transportation Research Part A: Policy and Practice*, 92, 131–144. <https://doi.org/10.1016/j.tra.2016.07.005>
- Hurst, N. B., & West, S. E. (2014). Public transit and urban redevelopment: The effect of light rail transit on land use in Minneapolis, Minnesota. *Regional Science and Urban Economics*, 46(1), 57–72. <https://doi.org/10.1016/j.regsciurbeco.2014.02.002>
- Infrastructure Canada. (2018). Building Strong Cities Through Investments in Public Transit. Retrieved from <https://www.infrastructure.gc.ca/plan/ptif-fitc-eng.php>
- Jones, C. E., & Ley, D. (2016). Transit-oriented development and gentrification along Metro Vancouver's low-income SkyTrain corridor. *Canadian Geographer*, 60(1), 9–22. <https://doi.org/10.1111/cag.12256>
- Knowles, R., & Ferbrache, F. (2014). An Investigation into the Economic Impacts on Cities of Investment in Light Rail Systems. Knowles, R., & Ferbrache, F. (2014). *An Investigation into the Economic Impacts on Cities of Investment in Light Rail Systems*, (June), 100., (June), 100.
- Knowles, R., & Ferbrache, F. (2016). Evaluation of wider economic impacts of light rail investment on cities. *Journal of Transport Geography*, 54, 430–439. <https://doi.org/10.1016/j.jtrangeo.2015.09.002>
- Kuminoff, N. V., Parmeter, C. F., & Pope, J. C. (2010). Which hedonic models can we trust to recover the marginal willingness to pay for environmental amenities? *Journal of Environmental Economics and Management*, 60(3), 145–160. <https://doi.org/10.1016/j.jeem.2010.06.001>
- Lancaster, K. J. (1966). A New Approach to Consumer Theory. *Journal of Political Economy*, 74(2), 132–157.
- Lee, J., Choi, K., & Leem, Y. (2016). Bicycle-based transit-oriented development as an alternative to overcome the criticisms of the conventional transit-oriented development. *International Journal of Sustainable Transportation*, 10(10), 975–984. <https://doi.org/10.1080/15568318.2014.923547>
- Lee, S., & Lee, B. (2014). The influence of urban form on GHG emissions in the U.S. household sector. *Energy Policy*, 68, 534–549. <https://doi.org/10.1016/j.enpol.2014.01.024>

- Litman, T. (2007). Evaluating rail transit benefits: A comment. *Transport Policy*, 14(1), 94–97. <https://doi.org/10.1016/j.tranpol.2006.09.003>
- Litman, T. (2012a). Community Cohesion As A Transport Planning Objective. *Victoria Transport Policy Institute*, (February), 1–22. <https://doi.org/10.1001/archpsyc.63.7.757>
- Litman, T. (2012b). Evaluating Transportation Economic Development Impacts. *Victoria Transport Policy Institute*.
- Liu, X., Deng, Y., & Le Vine, S. (2016). Residential relocation in response to light rail transit investment: case study of the Hudson–Bergen Light Rail system. *Journal of Modern Transportation*, 24(2), 139–144. <https://doi.org/10.1007/s40534-016-0100-z>
- McIntosh, J. R. (2015). Framework for land value capture from investments in transit in car-dependent cities. *Journal of Transport and Land Use*, 155–185. <https://doi.org/10.5198/jtlu.2015.531>
- Modarres, A. L. I. (2011). Polycentricity , Commuting Pattern , Urban Form : The Case of Southern California, 35(November), 1193–1211. <https://doi.org/10.1111/j.1468-2427.2010.00994.x>
- Mohammad, S. I., Graham, D. J., Melo, P. C., & Anderson, R. J. (2013). A meta-analysis of the impact of rail projects on land and property values. *Transportation Research Part A: Policy and Practice*, 50, 158–170. <https://doi.org/10.1016/j.tra.2013.01.013>
- Moos, M., Vinodrai, T., Revington, N., & Seasons, M. (2018). Planning for Mixed Use: Affordable for Whom? *Journal of the American Planning Association*, 84(1), 7–20. <https://doi.org/10.1080/01944363.2017.1406315>
- Morais, R. J. (2010). *Refocusing Focus Groups: A Practical Guide*. Ithana: Paramount Market Publishing, Inc.
- Morgan, D. L. (1998). *The Focus Group Guidebook*. Thousand Oaks: Sage Publications, Inc.
- Mueller, E. J., Hilde, T. W., & Torrado, M. J. (2018). Methods for countering spatial inequality: Incorporating strategic opportunities for housing preservation into transit-oriented development planning. *Landscape and Urban Planning*, 177(September 2017), 317–327. <https://doi.org/10.1016/j.landurbplan.2018.01.003>
- Muth, J. F. (1969). *Cities and housing : the spatial pattern of urban residential land use*. Chicago: University of Chicago Press.
- Nahlik, M. J., & Chester, M. V. (2014). Transit-oriented smart growth can reduce life-cycle environmental impacts and household costs in Los Angeles. *Transport Policy*, 35, 21–30. <https://doi.org/10.1016/j.tranpol.2014.05.004>
- Nazarnia, N., Schwick, C., & Jaeger, J. A. G. (2016). Accelerated urban sprawl in Montreal , Quebec City , and Zurich : Investigating the differences using time series 1951 – 2011, 60, 1229–1251.
- Nechyba, T. J., & Walsh, R. P. (2004). Urban Sprawl. *Journal of Economic Perspectives*, 18(4), 177–200. <https://doi.org/10.1257/0895330042632681>
- Neudorf, J. (2014). *Understanding Accessibility , Analyzing Policy : New Approaches for a New Paradigm by*. University of Waterloo.

- Páez, A., Scott, D. M., & Morency, C. (2012). Measuring accessibility: Positive and normative implementations of various accessibility indicators. *Journal of Transport Geography*, 25, 141–153. <https://doi.org/10.1016/j.jtrangeo.2012.03.016>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Pan, H., Li, J., Shen, Q., & Shi, C. (2017). What determines rail transit passenger volume? Implications for transit oriented development planning. *Transportation Research Part D: Transport and Environment*, 57(September), 52–63. <https://doi.org/10.1016/j.trd.2017.09.016>
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: integrating theory and practice*. Thousand Oaks, California: SAGE.
- Pi, X. (2017). Exploring Rental Housing Market in Kitchener-Waterloo, Ontario. <https://doi.org/http://hdl.handle.net/10012/12431>
- Piore, M. J. (2006). Qualitative research: does it fit in economics? *European Management Review*, 3, 17–23. Retrieved from doi:10.1057/palgrave.emr.1500053
- Plays, T., & Atchison, C. (2008). *Research Decisions: Quantitative and Qualitative Perspectives, Fourth Edition*. Toronto: Nelson.
- Procter, A., Bassi, A., Kolling, J., Cox, L., Flanders, N., Tanners, N., & Araujo, R. (2017). The effectiveness of Light Rail transit in achieving regional CO2 emissions targets is linked to building energy use: insights from system dynamics modeling. *Clean Technologies and Environmental Policy*, 19(5), 1459–1474. <https://doi.org/10.1007/s10098-017-1343-z>
- Qviström, M. (2015). Putting accessibility in place: A relational reading of accessibility in policies for transit-oriented development. *Geoforum*, 58, 166–173. <https://doi.org/10.1016/j.geoforum.2014.11.007>
- Ratner, K. A., & Goetz, A. R. (2013). The reshaping of land use and urban form in Denver through transit-oriented development. *Cities*, 30(1), 31–46. <https://doi.org/10.1016/j.cities.2012.08.007>
- Region of Waterloo. (2018). *Year-End 2017 Population and Household Estimates for Waterloo Region*.
- Region of Waterloo Planning Development and Legislative Services Community Planning. (2016). *ION Story*. Region of Waterloo.
- Region of Waterloo Planning Development and Legislative Services Community Planning. (2017). *2016 Labour Force Report*.
- Renne, J. L., Tolford, T., Hamidi, S., & Ewing, R. (2016). The Cost and Affordability Paradox of Transit-Oriented Development: A Comparison of Housing and Transportation Costs Across Transit-Oriented Development, Hybrid and Transit-Adjacent Development Station Typologies. *Housing Policy Debate*, 26(4–5), 819–834. <https://doi.org/10.1080/10511482.2016.1193038>

- Revington, N., & Townsend, C. (2016). Market Rental Housing Affordability and Rapid Transit Catchments: Application of a New Measure in Canada. *Housing Policy Debate*, 1482(March), 1–23. <https://doi.org/10.1080/10511482.2015.1096805>
- Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, 82(1), 34–55. <https://doi.org/10.1086/260169>
- Sirmans, G. S., Macpherson, D. A., & Zietz, E. N. (2005). The Composition of Hedonic Pricing Models. *Journal of Real Estate Literature*, 13(1), 3–43. <https://doi.org/Article>
- Sorensen, A. (1999). Land Readjustment, Urban Planning and Urban Sprawl in the Tokyo Metropolitan Area. *Urban Studies*, 36(13), 2333–2360. <https://doi.org/10.1080/0042098992458>
- Stake, R. E. (1995). *The art of case study research*. SAGE.
- Stewart, D. W., Shamdasani, P. N., & Rook, D. W. (2007). *Focus Groups: Theory and Practice*. Thousand Oaks: Sage Publications, Inc.
- Stopher, P. R. (2004). Reducing road congestion: A reality check. *Transport Policy*, 11(2), 117–131. <https://doi.org/10.1016/j.tranpol.2003.09.002>
- Styśko-Kunkowska, M. (2014). *Interviews as a qualitative research method in management and economics sciences*. Warsaw: World Economy at Warsaw School of Economics.
- Tayarani, M., Poorfakhraei, A., Nadafianshamabadi, R., & Rowangould, G. M. (2016). Evaluating unintended outcomes of regional smart-growth strategies: Environmental justice and public health concerns. *Transportation Research Part D: Transport and Environment*, 49, 280–290. <https://doi.org/10.1016/j.trd.2016.10.011>
- Taylor, B. D. (2004). The politics of congestion mitigation. *Transport Policy*, 11(3), 299–302. <https://doi.org/10.1016/j.tranpol.2004.04.001>
- Thomas, R., & Bertolini, L. (2014). Beyond the Case Study Dilemma in Urban Planning: Using a Meta-matrix to Distil Critical Success Factors in Transit-Oriented Development. *Urban Policy and Research*. Taylor & Francis. <https://doi.org/10.1080/08111146.2014.882256>
- Topalovic, P., Carter, J., Topalovic, M., & Krantzberg, G. (2012). Light Rail Transit in Hamilton: Health, Environmental and Economic Impact Analysis. *Social Indicators Research*, 108(2), 329–350. <https://doi.org/10.1007/s11205-012-0069-x>
- Trost, S. G., Kerr, L. M., Ward, D. S., & Pate, R. R. (2001). Physical activity and determinants of physical activity in obese and non-obese children. *International Journal of Obesity*, 25(6), 822–829. <https://doi.org/10.1038/sj.ijo.0801621>
- Trudeau, D. (2013). New Urbanism as Sustainable Development? *Geography Compass*, 7(6), 435–448. <https://doi.org/10.1111/gec3.12042>
- van Lierop, D., Maat, K., & El-Geneidy, A. (2017). Talking TOD: learning about transit-oriented development in the United States, Canada, and the Netherlands. *Journal of Urbanism*, 10(1), 49–62. <https://doi.org/10.1080/17549175.2016.1192558>
- Villasenor, N. R., Tulloch, A. I. T., Driscoll, D. A., Gibbons, P., & Lindenmayer, D. B. (2017). Compact development minimizes the impacts of urban growth on native mammals. *Journal of Applied Ecology*, (54), 794–804. <https://doi.org/10.1111/1365-2664.12800>

Wallace, A. (2004). Understanding Local Housing Markets ? The need for a complementary institutional approach Understanding Local Housing Markets ? The need for a complementary institutional approach . *Centre for Housing Policy*.

Willcocks, C. A. (2011). *Encouraging Family-Friendly Condominium Development and Creating Complete Communities in Downtown Toronto*. University of Waterloo.

Yin, C., Yuan, M., Lu, Y., Huang, Y., & Liu, Y. (2018). Effects of urban form on the urban heat island effect based on spatial regression model. *Science of the Total Environment*, 634, 696–704. <https://doi.org/10.1016/j.scitotenv.2018.03.350>

Appendix

Appendix A: Letter of Invitation

Exploring Household Location Choice Behaviour in Kitchener-Waterloo

Dear Realtor,

My name Justin Cook and I am a Master's student in the School of Planning at the University of Waterloo working, with professors Dr. Dawn Parker, Dr. Jeff Casello, and Dr. Jennifer Dean and planning undergraduate student Samantha Bajc. We are conducting research to explore changes in the housing market related to the introduction of the light rail transit system in Kitchener-Waterloo. Further background information about the project, including results to date, are available at <http://research.wici.ca/ugc/>.

We would like to invite you to share your professional insights by taking part in a 45-minute individual interview. Questions will include: What are some of the key housing/neighbourhood characteristics your clients ask for? What makes living close to the LRT un/desirable for your clients? What impact has/will the LRT have on your business? A full list of questions is available at your request. To take part in an individual interview please contact Justin Cook directly at: j8cook@uwaterloo.ca

All reports and publications resulting from the study will not use the names of participants to help protect confidentiality. Audio recording will be used for transcription and analysis only with your permission. To ensure we collect the strongest possible data, only those individuals who agree to be audio recorded will be invited to participate in the focus groups. Consent forms, audio records, and transcripts will be securely archived at the University of Waterloo. Information shared during the focus group session is considered confidential and we request that all participants respect the confidentiality of their participants but cannot guarantee that this will take place. The risks associated with this study are minimal.

Participation in this study is voluntary. You may withdraw from this study at any time or skip any question without impacting your relationship with the study researchers or Kitchener-Waterloo Association of REALTORS®. While we will not share your decision to participate in the study to employers, it is likely that management may become aware of your decision in the case of focus groups held at your place of employment. Study results will be disseminated to participants through reports, student theses, and open houses. Generally, the results of the study will be used to strengthen our understanding of the relationship between land-use change, housing markets and transportation.

This research is funded by the Social Sciences and Humanities Research Council of Canada. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#19555). If you have questions for the Committee

contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other questions contact Justin Cook (j8cook@uwaterloo.ca) or any of the investigators listed below.

Sincerely,

Justin Cook, Master's student, School of Planning, University of Waterloo
j8cook@uwaterloo.ca, 226-505-5560

Dawn Parker, Professor, School of Planning, University of Waterloo
dcparker@uwaterloo.ca, 519-888-4567 x38888

Jennifer Dean, Professor, School of Planning, University of Waterloo
jennifer.dean@uwaterloo.ca, 519-888-4567 ext. 39107

Appendix B: Focus Group Script

- Do you have a specific neighbourhood/area that most of your business is focused on?
 - Where is that?
 - What draws you to this area?
 - How do you typically market properties in these areas?
- Who are your typical clients?
 - What are some of the key housing/neighbourhood characteristics your clients ask for?
 - Housing type? (new vs old; low vs high density)
 - Lifestyle?
 - Transportation?
 - Sense of community?
 - Public services?
 - Culturally-specific amenities/resources?
 - Other?
- What are the most common factors that lead to a client's decision to purchase one property over another?
 - Do 'must haves' play a large role in the decision process?
 - Do you hear clients comparing a home to their "ideal home"?
 - How do "must haves" compare to client's "ideal"?
- What strategies do you see clients using to narrow down choices and make final decision?
 - How might you assist them in this process?
- What have you heard about the LRT from your clients?
 - Positive or negative views?
- Do you incorporate the LRT into the marketing of certain neighbourhoods?
 - How so?
- How do your clients view living close to the LRT?
 - Why is that?
 - Buyers vs sellers?
 - Who are the clients that most often feel this way?
- Do you think the LRT will change the real estate market in the Region?
 - How so?
 - Demographics diversity?
 - Accessibility to employment/services resources
 - Cultural vibrancy?
 - Affordability?
- Overall, how do you think the LRT will affect your business?
- Are there any other points you would like to discuss?

Appendix C: Informed Consent

Exploring Household Location Choice Behaviour in Kitchener-Waterloo

Consent Form

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Dr. Dawn Parker, Dr. Jennifer Dean, Dr. Jeff Casello and Justin Cook of the School of Planning at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted. I am informed that I may withdraw my consent at any time without penalty by advising the researcher.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#19555). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions contact Justin Cook j8cook@uwaterloo.ca. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES NO

I agree to allow the researcher(s) to record my voice while participating in the study.

YES NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

YES NO

I understand that information shared during the focus group session is confidential, and not to be repeated outside of the group. However, I understand that there is some limit to the researcher's ability to ensure complete confidentiality of responses given the format of a focus group.

YES NO

Participant Name: _____ (Please print)

Participant Signature: _____

Date: _____

Appendix D: Feedback Letter

Dear Participant,

We would like to thank you for your participation in our study “Exploring Household Location Choice Behaviour in Kitchener-Waterloo”. As a reminder, the purpose of this study is to investigate the relationship between the LRT system and residential housing in Kitchener-Waterloo. Your participation has been essential to the success of our research project

As a reminder, any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project, a summary of the study’s results will be made available to participants on the study website (insert website link). We will share our analysis with interested communities through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information regarding the results of this study, or if you have any questions about the study, please do not hesitate to contact myself Justin Cook at j8cook@uwaterloo.ca or Prof. Dawn Parker (dparker@uwaterloo.ca, 519-888-4567 x38888), or Prof. Jennifer Dean (jennifer.dean@uwaterloo.ca, 519-888-4567 ext. 39107).

As with all University of Waterloo projects involving human participants, this project was reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#19555). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other questions contact Justin Cook (j8cook@uwaterloo.ca) or any of the investigators listed below.

Yours Sincerely,

Justin Cook, Master’s student, School of Planning, University of Waterloo
j8cook@uwaterloo.ca, 226-505-5560

Dawn Parker, Professor, School of Planning, University of Waterloo
dcparker@uwaterloo.ca, 519-888-4567 x38888

Jennifer Dean, Professor, School of Planning, University of Waterloo
jennifer.dean@uwaterloo.ca, 519-888-4567 ext. 39107