MEMORANDUM
To: Miriam Novick
From: Student Writer
Date: Monday March 18th 2019
Subject: Research Proposal - Greater Toronto Area Intelligent Transportation Systems

INTRODUCTION
Transportation serves a vital role in the operation and infrastructure of society. This memo will propose research in regards to transportation within the scope of the Greater Toronto Area. The objective of this research is to find safe and suitable solutions to mitigate commute time, and efficient methods of transportation.

BACKGROUND
With the increasing population growth combined with inflating housing costs in Toronto, individuals are forced to commute from outside of the downtown core which results in heavily congested traffic, increased carbon dioxide emissions and increased gas prices (ITS Canada, 2019). In 2010, commute times to work within Toronto averaged 33 minutes by car and on average 44 minutes by public transportation (Statistics Canada, 2016). The dissatisfaction of commuters in areas populated with 1 million citizens or more increased with the growing rate of transportation congestion (Statistics Canada, 2016).

Through proposed research of Intelligent Transportation Systems (ITS) the challenge of transportation congestion within the Greater Toronto Area can be further analyzed for solutions in regards to safety, time, energy, money and health (ITS Canada, 2019). Through the use of "communication facilities, tracking systems, embedded sensors, on-board navigation," ITS can interact digitally with surround environments in order to quickly relay information for situations such as dynamic carshares or Global Positioning Systems (GPS). (Basu, 2019).

RESEARCH
        Viti, F.,& Tampère, C. (2014) Editorial: Models and Technologies for Intelligent Transportation Systems: New Challenges and Metaheuristic Solutions for Large-Scale Network Applications. *Journal of Intelligent Transportation Systems*,18:1, 1-4, DOI: 10.1080/15472450.2013.774678

Written in 2014, this article written by Viti and Tampère highlights the uses of Intelligent Transportation Systems to collect traffic data to adjust operational and management methods. Both authors have obtained PhD qualifications at the Engineering Department at the University

of Luxembourg, and have written other journal articles focusing on transit and large scale networks. This journal article summarizes information from several contributions published at a similar time, providing layers of insight into the process of ITS. The relevance of the article touches base on electronic ticketing systems which provide quicker tracking of technological information to systems such as GPS, therefore alerting commuters of congestion. Overall this source provides summaries of several topics pertaining to ITS, which can be used to elaborate on how transit in the GTA can be improved.

Sawyer, B. D., & Hancock, P. A. (2012). Development of a Linked Simulation Network to Evaluate Intelligent Transportation System Vehicle to Vehicle Solutions. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*,*56*(1), 2316–2320. https://doi.org/10.1177/1071181312561487

With degrees in Human Factors, Industrial Engineering and Psychology, Dr. Sawyer and Dr Hancock provide ample information on Vehicle to Vehicle and Infrastructure to Vehicle technologies in regards to Intelligent Transportation Systems. Written in 2012, the information provided is still considered relevant, although there may have been some advances in technology since that time period. However, the journal article provides visual material to graphically describe technological operations and future links which can be useful for further research purposes of ITS. Overall, as a published article, the intent of this piece of work is to summarize findings of the simulation and perhaps inform other professionals in the industry or academia.

Basu, A., (2019). Viability assessment of emerging smart urban para-transit solutions: Case of cab aggregators in Kolkata city, India. *Journal of Urban Management*. https://doi.org/10.1016/j.jum.2019.01.002

As an article with ample information on the process of ITS carsharing and app-cab services, this article would provide insight into how processes and data in India can be transferable between the GTA. Although the author, Dr. Basu, is an assistant professor at the Diamond Harbour Women's University in India (with no other published articles), the Journal of Urban Management is produced and hosted by Elsevier B. V. on behalf of Zhejiang University and Chinese Association of Urban Management, providing additional credibility. The recent publication of the article gives insight that is not outdated, and is relevant towards the technology of today. An informative piece, the article can be used by students, professors and industries in search of solutions to transportation challenges.

RATIONALE/BENEFITS

As the population increases in the GTA, transportation, traffic and commuting times will become significant factors in the lives of residing citizens. An increase of travel time comes an increase of traffic, pollution and stress resulting in an overall lower quality of life. Finding ways to solve fundamental transportation issues will result in the safety, growth and well being of Toronto residents. As a result of less time spent commuting, more time can be spent on leisure activities with focus on well being. The use of ITS can also assist in creating safer streets, resulting in minimized accidents on the road. In 2018, 41 pedestrian and 5 cycling deaths were reported on city roads in the GTA (Spurr, 2018). With the use of ITS, roads have the capacity to be better managed, organized and safer for everyone.

AUTHORIZATION

Overall, by analyzing solutions within the context of Intelligent Transportation Systems, this research proposes to find safe solutions in order to solve the issue of congested transportation within the Greater Toronto Area. By analyzing carsharing systems and apps, traffic data and systems devised overseas, this research looks forward to creating a reliable environment for GTA residents. In order to proceed forward with research, authorization and approval is requested to continue with proposed plan.

CITATIONS

Basu, A., (2019). Viability assessment of emerging smart urban para-transit solutions: Case of cab aggregators in Kolkata city, India. *Journal of Urban Management*. https://doi.org/10.1016/j.jum.2019.01.002

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Spurr, B. (2018). Toronto appears to have hit a one-year high in pedestrian and cyclist fatalities. Over 40 per cent of those deaths happened in Scarborough. *Toronto Star*. Retrieved 18 March 2019 from https://www.thestar.com/news/gta/2018/12/07/toronto-appears-to-have-hit-a-one-year-high-in-pedestrian-and-cyclist-fatalities-over-40-per-cent-of-those-deaths-happened-in-scarborough.html

Statistics Canada (2016). Transportation. Retrieved 17 March 2019 from https://www150.statcan.gc.ca/n1/pub/11-402-x/2012000/chap/trans/trans-eng.htm

Viti, F.,& Tampère, C. (2014) Editorial: Models and Technologies for Intelligent Transportation Systems: New Challenges and Metaheuristic Solutions for Large-Scale Network Applications. *Journal of Intelligent Transportation Systems*,18:1, 1-4, DOI: 10.1080/15472450.2013.774678