Promoting Innovative Freight Practices for Small Drayage and Cartage Companies in the Winnipeg Capital Region: A WinSmart Showcase Initiative

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Introduction

A literature review and a complementary social marketing and promotional campaign were advanced to introduce freight companies to innovative practices in the areas of trip scheduling, load matching, idle reduction, vehicle maintenance and operation, and driver education programs. The proposed practices were selected on their potential to optimize truck routing, reduce the number of part-empty running vehicles, make better use of transportation infrastructure, reduce congestion, and improve roadway safety.

Stakeholders

Distribution of urban goods involves participation of various stakeholders. Local government and police service facilitate mobility and access to roadways and urban infrastructure. Retailers, drivers, distributors, intermodal marketing companies, shippers and producers, consignees, drayage, and cartage and courier companies ease the distribution of parcels in the urban environment. These are equally important stakeholders.

Urban goods are delivered through direct or round distribution routing processes by small owners-operators, parcel and delivery firms, private carriers, and similar enterprises that haul freight for others for compensation.

Private fleets may operate trucks and cube vans, owned by retailers and distributors. Others may operate inter-modal diesel-powered tractor trailer fleets for urban and short-distance hauling. These companies dominate short haul urban, inter-provincial and intra-

provincial trips. For example, "shorter distance blocks account for much more movement (revenue) than long distance blocks. Length of hauls of 161 km. or less accounts for approximately 51 billions in revenue" (Mordok, E., Spasovic, L. N., 1995).

Vehicle Routing

The fundamental vehicle routing problem assumes that vehicle's routes are designed to "minimize some objective such as the total distance traveled" (Beasley, J.E. 2005) This objective concurs with the main goal of the WinSmart Showcase Truck Routing Program Initiative. Its purpose is to reduce GHG emissions by minimizing the distances driven by delivery fleets. In addition, optimization of commercial urban freight routing practices may involve consideration of other restrictions such as limitations on the number of hours a driver can work, hours of delivery in certain areas of the city, driver behaviour, and multi-depot and simultaneous customers being served with heterogeneous fleet of vehicles with various capacities.

Trucks account for a relatively low share of all transport operations in towns and cities; however, trucks are responsible for a much greater percentage of the pollution and noise caused by city traffic. Thus, decreasing the number of vehicles used, or maximizing their use for the distribution of urban goods, could greatly improve the environmental performance of freight in urban areas.

Accordingly, reduced fleets may also influence public opinion which increasingly perceives truck traffic as polluting, but on the other hand, it is clear that trucks are indispensable for goods transport in cities (Cost-Transport).

Reduced Distance

A reduced distance traveled could potentially decrease both operating costs for the freight companies and reduce their adverse impacts on the local environment. A reduction on the distance traveled brings positive social, economic, and environmental benefits. These gains are articulated through the concept known as "city logistics".

Through communication, cooperation and co-ordination between stakeholders, "city logistics" attempts to reduce significantly the number of delivery vehicles traveling on the roads to, from, and within the cities; the number of miles they cover; and the resulting impacts in terms of congestion, disruption and noise, and, air pollution. Therefore, the initiatives proposed by "city logistics" focus on a balanced view of environmental quality concerns, in harmony with the commercial interests of the freight companies (Drejer, C. Ed. 2004).

Best Practices

A "best practice" is defined as a planned or implemented private only, public only or public-private partnership strategies, measures, or activities which have an essential contribution to urban goods transport and ideally lead to benefits for all stakeholders involved.

The following requirements are relevant:

- They have to fit to a defined theme or address a relevant problem with respect to the movement of goods in urban areas
- They should be based on real experiences or analysis in studies
- They should have considerable and measurable positive effects for all stakeholders on relevant indicators of urban goods transport (BESTUFS 2001).

Proposed Solutions

Over 40 best practices were proposed for the consideration of the local transportation industry and stakeholders based on their potential to minimize either the number of vehicles used or the total distance traveled (or both) and their potential to contribute to an efficient delivery of parcels and movement of goods in the urban environment.

Overall, the proposed solutions anticipated their ability to help the transportation industry to achieve (among other things) the following objectives:

- Lower vehicle emissions through improvements to vehicle standards, operation and maintenance
- Reduce cost for business and freight operators through quicker and more predictable deliveries as access information conditions are improved
- Increase safety through improved operator's driving skills and reduced vehicle mileage

Proposed best practices, solutions and initiatives encompass a series of generic Logistics, Local Government, and Industry Partnerships strategies, suitable for implementation in any urban environment.

a) Logistics best practices (Muñozury, J., et al , 2005).

Logistics entails initiatives to be implemented by the industry, aimed at providing a more efficient freight delivery service including load matching, idle reduction practices, and computerized vehicle routing and scheduling, computer equipment and web-based technologies.

Logistics also considers the lack of parking space in delivery areas, peak-hour congestion, vehicle service hours, fleet operation and maintenance, roadway usage, routing schedule and all other aspects affecting the delivery flow of urban goods or logistics.

b) Local government solutions (Ibid).

Include specific (Local government) and combined (Stakeholders) driven public infrastructure, land use management, access conditions, and traffic management solutions designed to improve urban traffic (mobility) and to address land use concerns (accessibility) affecting delivery of urban goods.

c) Partnerships (Muñozury, J., et al , 2005)

Comprise best practices intended for implementation by established partnerships between companies and local authorities to optimize routing and scheduling operations. Interrelations between shipper's interest, building owners and managers, enforcement officials, and the needs of retailers, business owners, and service providers affect the operational efficiency of transportation companies operating in urban areas. Several factors could negatively impact operational efficiencies and route optimization efforts by freight companies. These may include prevailing distribution models, posted delivery hours, parking space availability, loading and unloading time restrictions, and access to downtown areas.

Selected Best Practices and Initiatives

Proposed best practices were considered in the context of the WinSmart Showcase, a three-level government transportation initiative advanced to promote sustainable distribution of goods and services, reduce congestion, improve vehicle's efficiency, minimize pollution and reduce greenhouse gas emissions (GHG) resulting – among others- from the operation of local drayage and cartage delivery vehicles. These proposed initiatives focus on a balanced view of environmental quality concerns, in harmony with the commercial interests of the freight companies, leading to competitive and profitable operations. The proposed initiatives strive to attain the following proposed benefits in the following areas:

1) Trip Scheduling

- Minimize the number of vehicles used
- Minimize the total distance traveled
- Minimize some combination of number of vehicles used and total distance or time traveled (Beasley, J.E. 2005).

2) Load Matching

- Eliminate unnecessary roundtrip miles by empty or partly loaded running vehicles
- Consolidate cargo in fewer containers or locations
- Optimize weight distribution (on vehicle) to better use available space

3) Idle-Reduction Programs

- Modify certain industry and driver behaviours and perceptions that lead to engine-idling
- Encourage message to target group within their spheres of influence.
- Reduce idling to save fuel consumption and reduce carbon emissions

4) Vehicle's Operations And Maintenance

- Reduce energy consumption in the form of purchased fuel
- Improve the number of miles traveled by vehicle
- Improve operational efficiency of vehicles and fleets

5) Driver's Training and Awareness Programs

- Refine competence skills and attitudes toward technological changes in organized settings
- Improve efficiency by promoting fuel saving and vehicle maintenance techniques which reduce fuel consumption and improve vehicle utilization
- Correlate measurement of these objectives to established key performance indicators (KPI)

Brief Summary for Illustration Purposes

The complete summary is available online.[1] Overall, it is expected the proposed initiatives could potentially help the transportation industry to achieve –among others- the following objectives:

1. Trip Scheduling

Trip scheduling consists of solving the problem of designing a distribution route to minimize some combination of number of vehicles used and total distance or time traveled (Beasley, J.E. 2005).

Table 1. Selected Best Practices and Initiatives to Address Trip Scheduling Operation

Logistics

- Joint reception: Carriers eliminate multiple delivery points; then deliver to same point all goods corresponding to a group of receivers.
- Data collection for modeling purposes: To measure Key Performance Indicators of efficient road freight operation, and fleet performance management.
- Urban delivery services using work-bikes or "zero-emission" vehicles based on the concept of 'pick-up and drop-off' points, load consolidation, and back hauling to eliminate under use of resources.

Local Administration

- Town centre access control: Controlling access by time of day and/or type of vehicle to reduce pedestrian/vehicle conflicts, and
- Carrier classification: Different types of carriers present during different delivery times, different number of deliveries, and different duration.
- Harmonization of regulations: Unification of policies to harmonize accessibility and unify access time windows.

Table 1. Selected Best Practices and Initiatives to Address Trip Scheduling Operation (Cont).

Traffic Management • Route and access control: Traffic management and land use policies. • On-line zone reservation system: Freight zone reservation system • Freight in urban mobility master plans /transportation plans.

2. Load Matching Operations

The efficient delivery of urban goods and small packages requires complex planning solutions to consolidate and optimize (match) cargo loads to eliminate unnecessary roundtrip miles by empty or partly loaded running vehicles.

The following table displays a summary of best practices and initiatives to optimize the value capacity of the vehicle fleet, and to reduce the proportion of vehicles-km running empty.

Table 2. Selected Best Practices and Initiatives to address Load Matching Operations

Logistics • Freight carrier cooperation: Opportunity to achieve larger load factors and economies of scale by having a single carrier collecting all the goods to be transported by different carriers. • Joint deliveries: A cooperation scheme involving specific sector (less-than-truckloads) to reduce the number of vehicles and traveled distances. • Urban Consolidation Centres (UCC): Carriers consolidate freight, distribute it cooperatively, and reduce vehicle trips and distances.

3. Idle-Reduction Practices and Initiatives

Idling increases fuel consumption, augments noise level in adjacent facilities, and contributes to air pollution. The objective is to modify certain industry perceptions and driver's behaviours that lead to engine idling. Table 3 presents an overview of some technological advancements, local government and partnerships, and driver's behaviour modification best practices and initiatives to reduce idling practices:

Table 3. Selected Best Idle-Reduction Practices and Initiatives

Logistics

- Financial assistance programs to help companies reduce fuel consumption: Proposes programs to overcome lack of investment to promote widespread adoption of idle-reduction technologies and increase compliance with state idling reduction laws.
- Market-based approaches to idle-reduction: A series of initiatives promoting fuel consumption reduction technologies, loans, investments on infrastructure, and programs to provide idle-reduction equipment to trucking companies.
- Behaviour modification: Protecting public health and the environment by reducing emissions while conserving fuel and maintaining adequate rest and safety for drivers.

Local Administration

- City ordinances or bylaws to achieve behaviour modification for idle-reduction: Exercise control and influence on adjacent and other land uses where trucks idle.
- Idle-reduction initiatives through urban planning and zoning: Identification and mapping of truck stops, travel centres, and other locations where heavy trucks idle.

4. Vehicle Operation and Maintenance

Currently, the objectives of many businesses are to improve operational efficiency, improve number of miles traveled, extend vehicle life, and reduce energy consumption in the form of purchased fuel.

Whether a business uses cars, vans or trucks, adoption of best vehicle operation and maintenance practices helps the company to save money.

Table 4. Selected Best Vehicle's Operation and Maintenance Practices and Initiatives

Logistics • Vehicle utilization: Initiatives to reduce empty truck running, increase back-loading, delivery schedules and improve shipping and receiving practices. • Maintenance (Measures deemed appropriate for small & medium-size delivery companies): Measures to promote speed and idle-reduction, improved freight logistics, and inter-modal shipping. • Performance management program to measure transport efficiency across different fleets: Programs to measure efficiency across different fleets using Key Performance Indicators to identify opportunities to maximize efficiency.

5. Driver Training and Awareness Programs

Driver training programs are a vital component of a sustainable freight distribution strategy. Training programs improve driver's attitudes toward technological changes and refine competence skills and driving abilities in organized settings. Reading maps, organizing workloads and providing customers with outstanding service are all abilities developed through commercial driver training programs. The benefits of educated drivers are many. Professionally trained drivers are able to obey posted speed limits, parking-hours signs, and

make better use of existing local infrastructure. In addition, educated drivers are better suited to take advantage of the benefits introduced by intelligent technologies, safe driving, and fuel saving techniques, real time data logging procedures and vehicle operation and maintenance practices to improve freight transport operations.

Training programs help companies and operators to improve driver's behaviours and perceptions regarding energy consumption, vehicle maintenance and operation.

Moreover, training helps drivers realize the advantages of observing speed limits, understand correct use of gears, braking procedures and idle-reduction techniques. As a result, training also promotes safer and healthier driving practices. Here is a brief survey of existing driver's education programs implemented to improve freight management activities.

Table 5. Selected Driver's and Awareness Practices and Initiatives

Logistics
• Fuel saving programs through driver education training (Canada): Smart Driver in the City (for fleets that operate within a 100 km radius of their head office) has been designed to make fleets more fuel-efficient, reduce business costs, protect the environment, and provide drivers with defensive driving techniques.

Establishing Partnerships

This review suggests establishing partnerships (when appropriate) between small and medium-size companies and local authorities to address urban distribution challenges, including land use and zoning, traffic and access management, and the enforcement of specific local government regulations.

The Innovative Freight Initiative suggests establishing a 4C's approach (Consolidation, Cost Optimization, Collaboration, and Compliance with transportation laws and regulations) (O'Reilly 2002) to minimize the total transportation cost of moving a load from origin to destination at or the most convenient time-window.

Social Marketing

A Social Marketing Campaign was designed and implemented to promote dissemination, acceptance and adoption by urban freight companies of the proposed Innovative Freight Best Practices and Solutions to reduce (GHG) in the Winnipeg Capital Region.

Social Marketing is defined as "the planning and implementation of programs designed to bring about social change using concepts from commercial marketing, and as a tool to promote innovative ideas and influence changes in perceptions and behaviours in a target audience."

Social Marketing endeavours to influence effective action by gaining a clear understanding of the target audience, its needs and perceptions on the issue, and by understanding that "action is undertaken whenever target audiences believe that the benefits they receive will be greater than the costs they incur" (Social Marketing Institute).

Proposed Next Steps

This review suggests advancing the following activities to build on the interest generated by the program among members of the local freight industry and to continue the promotion of the sustainable transportation practices proposed by the Innovative Freight Initiative:

a. Establishing Urban Freight Partnerships.

Partnerships could help local government and industry to work together to advance programs to reduce emissions and more importantly, to reduce the number of vehicles in and around the urban centre. The objective is to evaluate the number of building and

infrastructure restrictions, loading/unloading zone management, peak hour delivery, and multimodal freight management conflicts taking place in the urban environment, most generally in the "Last Mile."[2]

b. Incorporating Freight into the Planning Process

The province of Manitoba is positioning itself as a major transportation gateway. Thus, the need to incorporate freight into the planning process becomes more apparent; particularly to assess the combined impact of roadway construction, expansion and rehabilitation works facilitating access and mobility in and around existing (and proposed) transportation facilities.

Incorporating freight into the planning process entails involving shippers, building owners & managers, security, enforcement agencies and business managers engaging in the process of identifying logistical priorities, as they relate to industry trends and transportation infrastructure.

c. Monitoring Progress of Key Performance Indicators

The Innovative Freight Initiative is a clear beginning towards the promotion of sustainable distribution practices of goods and services in the Winnipeg Capital Region. However, to reduce the resulting environmental and community impacts, particularly from urban freight movement, it is imperative to bring together residents, industries and local authorities to find solutions to shared concerns.

This process may entail providing all parties with the necessary opportunities to enhance their mutual understanding, foster appreciation for established policies and regulations, and encourage freight industry and business to become more involved in the urban freight movement decision-making process.

Conclusions

Transport Canada has identified the movement of goods within urban regions as a key emerging issue in Canada. Urban goods movement

generates positive community development outcomes, contributes to employment and enhances our economy's competitiveness.

Thus, development of freight partnerships is vital to the promotion of sustainable distribution strategies, to work together to advance social marketing programs to reduce emissions, and to secure mobility choices for goods, services and people; and similarly for slow moving and/or non-motorized forms of transportation sharing the roadway network with urban freight operators.

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Notes

[1] [Online at http://umanitoba.ca/faculties/management/ti/media/Innovative_freightnotebookwcover.pdf].

[2] Refers to the problems encountered in the business to customer (B2C) supply chain (i.e., distribution warehouse to final delivery) National Center for Policy Research (NCPR 15) [RFP] Understanding Urban Goods Movements (Posted Date: 4/15/2008).