Literature Search 615: Identify Best Types of Commodity Flow Data for Freight, Railroad, Ports and Waterway Studies
Thursday, July 2, 2020

Prepared for: Marcus Bekele

Prepared by: Qin Tang, Librarian

Resources searched: Library Catalog, TRID, Pooledfund.org, Internet

Summary: Results are compiled from the databases named above. Links are provided for full-text, if applicable, or to the full record citation.

Freight Flows by Highway, Railway, and Waterway: 2017

The Commodity Flow Survey 2020 workshop
https://www.bts.gov/cfs
The final data will be released on July 16, 2020.

Preliminary 2017 Commodity Flow Survey data is available.
https://www.bts.gov/surveys/commodity-flow-survey/2017-cfs-preliminary-data

2019 Innovations in Freight Data Workshop
https://pooledfund.org/Details/Study/635

2017 Innovations in Freight Data Workshop report

Impacts of policy-induced freight modal shifts
The main goal of NCFRP Project 44 was to "develop a handbook for public practitioners that describes the factors shippers and carriers consider when choosing freight modes and provides an analytical methodology for public practitioners to quantify the probability and outcomes of policy-induced model shifts". To achieve this goal, the research team undertook a major effort to secure access to the confidential Commodity Flow Survey (CFS) microdata--the most comprehensive freight dataset in the United States--to complement the CFS with confidential shipper data and modal data and to use state-of-the-art econometric modeling techniques. This significant research effort overcame some of the most significant challenges to the study of freight mode choice in the United States.
http://www.trb.org/Publications/PubsNCFRPProjectReports.aspx
NCFRP 40

Using commodity flow survey microdata and other establishment data to estimate the generation of freight, freight trips, and service trips : Guidebook
TRB's National Cooperative Freight Research Program (NCFRP) Research Report 37: Using Commodity Flow Survey Microdata and Other Establishment Data to Estimate the Generation of Freight, Freight Trips, and Service Trips: Guidebook provides policy makers with improved establishment-level models that estimate the Freight Trip Generation (FTG), the number of vehicle trips produced and attracted at a given establishment; the Freight Production (FP), the
amount of cargo produced by the establishment; and the Service Trip Attraction (STA), and the number of vehicle trips that arrive at the establishment to perform a service activity. These models, estimated with the best data available, provide tools to assess the various facets of the overall Freight and Service Activity (FSA) that takes place in urban and metropolitan areas. The models will allow transportation practitioners to conduct sound curb-management, properly size loading and unloading areas, support traffic impact analyses, and improve transportation planning and management efforts.

http://www.trb.org/Publications/Blurbs/175283.aspx
NCFRP 37

Reinforcement learning framework for freight demand forecasting to support operational planning decisions.
Al Hajj Hassan Lama; Mahmassani Hani S; Chen Ying Transportation Research Part E: Logistics and Transportation Review. 2020/5. 137(0) 101926

Freight forecasting is essential for managing, planning operating and optimizing the use of resources. Multiple market factors contribute to the highly variable nature of freight flows, which calls for adaptive and responsive forecasting models. This paper presents a demand forecasting methodology that supports freight operation planning over short to long term horizons. The method combines time series models and machine learning algorithms in a Reinforcement Learning framework applied over a rolling horizon. The objective is to develop an efficient method that reduces the prediction error by taking full advantage of the traditional time series models and machine learning models. In a case study applied to container shipment data for a US intermodal company, the approach succeeded in reducing the forecast error margin. It also allowed predictions to closely follow recent trends and fluctuations in the market while minimizing the need for user intervention. The results indicate that the proposed approach is an effective method to predict freight demand. In addition to clustering and Reinforcement Learning, a method for converting monthly forecasts to long-term weekly forecasts was developed and tested. The results suggest that these monthly-to-weekly long-term forecasts outperform the direct long term forecasts generated through typical time series approaches.

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Subject Classification: Freight Transportation; Planning and Forecasting

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America's Rolling Warehouses: Opportunities and Challenges with the Nation's Freight Delivery System.
2019/10. 37p

This report looks at trends in U.S. freight traffic including current and projected levels of freight movement, modal share, fatal crashes involving large trucks, and the impact of traffic congestion on freight delivery. Analysis is based on data from the Federal Highway Administration's Freight Analysis Framework. States are ranked, based on 2016 data, by greatest amount of freight shipped by all modes and by truck only. The report also forecasts percentage increase in freight shipments for the top 20 states from 2016 to 2045. States with the largest annual average number of fatalities in truck involved crashes include Texas, California, Florida, Georgia, and Pennsylvania. The top commercial truck bottlenecks are listed by location with average speed. The report also discusses the impact of emerging technology on freight including the growth of e-commerce and autonomous truck development. Recommendations for improving the U.S. freight transportation system include expanding capacity, especially at major bottlenecks, and establishing funding that is reliable and specifically dedicated to freight projects.

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Subject Classification: Freight Transportation; Motor Carriers; Operations and Traffic Management; Planning and Forecasting; Safety and Human Factors
Machine learning for international freight transportation management: A comprehensive review.
Barua Limon; Zou Bo; Zhou Yan
Machine learning (ML) offers a promising avenue for international freight transportation management (IFTM) given its capability to harness the power of data that have become increasingly available to freight transportation researchers and practitioners. This paper conducts a comprehensive investigation of the state-of-the-art in developing ML models for applications to different aspects of IFTM. We start by giving an overview of various fundamental ML methods. Then, how different ML methods have been employed, adapted, and applied to a multitude of subject areas in IFTM are discussed, including demand forecast, operation and asset maintenance, and vehicle trajectory and on-time performance prediction. The potential data sources that may be used to develop ML models are further examined. Subsequently, a synthesis of the exiting work is performed to identify the specific topics addressed in the existing research, ML methods used, the trends of research, and opportunities for further explorations. Four directions for future research are proposed in the end.

Towards a Smart Urban Freight Plan.
Dong Maggie; Singh Varanesh; Peters Dinniece; Ukegbu Charles C N; Collars Rosanna; Dack Joseph; Duan Lian
Technological advancements in the transportation industry are changing the way planners envision, plan, and manage transportation systems. In the domain of urban freight planning, recently available real-time vehicle data and new analytical tools have opened up new opportunities for planners to enhance understanding and embrace a smarter and more rigorous policy-making process. In late 2016, the New York City Department of Transportation (NYCDOT) started a SMART Truck Management Plan as a key initiative to address the challenges of freight management and achieve the freight goals identified in NYCDOT's 2016 Strategic Plan. A notable feature of the plan is its keen commitment to the use of new data and tools throughout the development process. This paper provides a detailed description of this data-driven planning process. Specifically, it presents how planners leveraged truck activity data to (1) measure truck movement efficiency, (2) explore the environmental factors behind off-route driving behavior, and (3) identify and prioritize projects and strategies. Through these practices, the paper seeks to initiate a conversation on how today's cities can capitalize on new data and models to expand the capacity of their freight management systems and adopt a more robust, informed, and integrated planning process.

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Freight payment 2020: data rules: we take a dive into the data-dense world of freight audit and payment and discover why the keys to data management in this ever-evolving segment are control, accuracy and visibility.

SCHULZ JOHN D
Logistics management (Highlands Ranch, Colo.: 2002). 2020/1. pages 28-31
Subject Classification: Freight Transportation

State of the art and practice of urban freight management.
Holguin Veras Jose; Leal Johanna Amaya; Sanchez Diaz Ivan; Browne Michael; Wojtowicz Jeffrey
The first in a series of two, this paper conducts a review of the public-sector initiatives that could be used to improve freight activity in metropolitan areas; collects data about initiatives that have been implemented and their performance; and produces a ranking of suggested initiatives. The review of public-sector initiatives is based on a comprehensive analysis of their performance, which cataloged the initiatives into seven major groups, 15 subgroups, and 48 unique initiatives. The initiatives covered in this paper include: Infrastructure Management; Parking/Loading Areas Management; Vehicle-Related Strategies; and Traffic Management. The characterization of the state of the practice and the performance of the initiatives was based on a survey that collected data from 32 countries and 56 cities throughout the world. The third component of the work is a ranking of suggested initiatives based on the performance data collected by the survey. The paper ends with a discussion of chief findings.

State of the art and practice of urban freight management Part II: Financial approaches, logistics, and demand management.
Holguin Veras Jose; Leal Johanna Amaya; Sanchez Diaz Ivan; Browne Michael; Wojtowicz Jeffrey
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Subject Classification: Finance; Freight Transportation; Planning and Forecasting; Policy

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Subject Classification: Data and Information Technology; Freight Transportation; Operations and Traffic Management

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Application of the freight rate on freight flow forecast.
Zhang R M; Huang L
As an important transportation mode in the urban development, highway freight transportation is of great significance to the economy of the city. Through the analysis of highway freight transportation's development trends, the role of road transportation in economic activities can be better understood. For the lack of statistical data, the development trends of China's urban road freight traffic have long remained unknown. This paper adopted a new method to estimate the trends of a city's road freight based on freight rate information. Through the establishment of a national freight rate matrix, two types of urban traffic patterns were determined and then the logistic regression model was employed to analyse the influencing factors of the freight flow. The results showed that GDP, the freight volume, the secondary industry ratio and location were the main factors for the prediction of the urban freight flow tendencies.

Challenges for Data Sharing in Freight Transport.
Moschovou T; Vlahogianni E I; Rentziou A Advances in Transportation Studies. 2019/7. 48 pp 141-152
The quantity and quality of data is considered as a critical factor that directly affects the potential output of freight transportation analysis. Reliable and sufficient data enable the detailed analysis for future planning, for both, infrastructure and operation of transport network. Although the significance of transport data is widely acknowledged by researchers and policy decision-makers, several issues still exist, limiting the proper collection but above all the use and sharing of freight data. The existence of various stakeholders and authorities, ranging from national statistical offices to shipping companies and logistics firms as well as the evolution of other non-traditional data sources as key-production "tools" for freight transport data make data collection and sharing a complex and timely consuming procedure. The present paper aims to provide a critical overview of existing sources of data for freight transportation, as well as of existing schemes for sharing these data between public and private sector. 
Findings reveal the complementarity between public and private sector roles in data collection and sharing data for freight transport. The combination of their roles and activities under a clearly defined partnership could result to mutual benefits for both sectors. The review results to a structured procedure with the form of a framework, which could enable an efficient cooperation among relevant actors for collecting and sharing data for freight transport.

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Publisher: University Roma Tre
URL https://gcc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.atsinternationaljournal.com%2FIndex.php%2F2019-issues%2Fxlviil-july-2019%2F1065-challenges-for-data-sharing-in-freight-transport%3Fhighlight%3DWyJ6aGFuZyIsInIiLCJtIiwiemhhbmcgciIsInIgbSJd&amp;data=02%7C01%7Cqin.tang%40state.mn.us%7C7C2c2eb8bb88e4f7fcc208d81ec997ed%7Ceb14b04624c445198f26b89c2159828c%7C0%7C1%7C637293198477727276&amp;sdata=6q6J73N3QzqG1%2BNUhzzRYD%2B%2Fme6z%2BcVTPpVusZkbt1c%3D&amp;reserved=0

Subject Classification: Data and Information Technology; Freight Transportation; Operations and Traffic Management

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Subject Classification: Economics; Freight Transportation; Highways; Planning and Forecasting

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Planning, designing and conducting establishment-based freight surveys: A synthesis of the literature, case-study examples and recommendations for best practices in future surveys.

Pani Agnivesh; Sahu Prasanta K
Transport Policy. 2019/6. 78(0) pp 58-75

The state-of-practice in planning, designing, and conducting freight surveys leave much to be desired, even in the era of big data analytics. This paper addresses this issue by providing a comprehensive, yet, inexpensive integrated data collection framework for conducting establishment-based freight survey (EBFS). The paper demonstrates the application of the proposed framework by implementing it in eight cities across two geographically dissimilar states of India. This is the first freight survey of its kind in terms of scale and scope in developing countries, where there is no established practice in freight data collection. Guidelines are suggested for overcoming challenges in EBFS such as: (a) efficient allocation of survey resources within budgetary constraints; (b) effective survey instrument design for reducing the respondent burden; (c) determination of sample size requirements and the expected number of sampling units to be contacted (d) development of sampling strategies using sampling frames with limited auxiliary information; and (e) data collection strategies to improve response rates. The heuristics for allocation of survey resources are mathematically formulated and predicted using the web-based survey responses obtained from planners of past surveys. Trade-off scenarios between different components of survey resources (money, time, and manpower) are presented to enable the planners to arrive at a suitable EBFS design for meeting research requirements within resource constraints. Analysis of results suggest that the response rates for EBFS are largely linked to the physical characteristics of commodities and city demography. The discussions provided on resource allocation, survey instrument design, sampling design, pilot surveys, interviewer training, response rate improvement strategies, and data processing are expected to guide for best practices in future surveys. In sum, the literature synthesis, case-study illustrations, and the proposed framework for EBFS design are expected to strengthen the state-of-practice of EBFS by making the rigorous random sample surveys less expensive, more systematic, and in turn, replacing the need to opt for convenience samples.

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