

Table of Contents

1.0	Introduction.....	1-1
1.1	Purpose and Audience for the Guidebook.....	1-1
1.2	The Need for Greater Attention to Freight Transportation Demand	1-1
1.3	Scope of this NCHRP Project and its Products.....	1-2
1.4	Organization of this Report.....	1-3
2.0	Demand Forecasting for Existing Facilities	2-1
2.1	Current and Historic Data on Facility Usage and Transport Activity	2-1
	Facility Data.....	2-2
	Published and Proprietary Data	2-2
	Special Surveys.....	2-3
2.2	Sources of Economic Forecasts.....	2-5
2.3	Economic Indicator Variables	2-6
	Some Examples.....	2-7
	Improving the Forecasts	2-12
2.4	Statistical Techniques	2-16
	Regression Analysis.....	2-16
	Other Time-Series Techniques	2-18
	The Structural Econometric Time-Series Approach	2-20
2.5	Alternative Futures	2-21
	Sensitivity Analysis	2-22
	Futures Analysis	2-24
3.0	Demand Forecasting for New Facilities.....	3-1
3.1	The Potential Freight Market.....	3-2
3.2	Forecasting Changes in the Market.....	3-3
3.3	Sources of Demand for a New Facility	3-3
	Route Diversion.....	3-4
	Induced Demand	3-8
3.4	Estimating Demand	3-9
	Survey Shippers and Carriers	3-10
	Comparisons with Previous New Facilities.....	3-17
	Evaluating Proximity and Level of Service.....	3-20
	Analyze Total Logistics Costs of Individual Shipments.....	3-23
3.5	Alternative Futures	3-24

Table of Contents

(continued)

3.6	Case Study: North Carolina Freight Airports	3-25
	Problem Definition and Research Objectives	3-25
	Market Characteristics	3-26
	<i>Market Demand</i>	3-26
	<i>Airport Traffic and Aircraft Activity</i>	3-29
	<i>Cargo Routing Patterns</i>	3-34
	<i>New Industrial Activity</i>	3-39
	Conclusions	3-44
4.0	Policy Analysis	4-1
4.1	Structuring the Policy Impact Assessment Process	4-1
4.2	Developing a Profile of Base-Case Conditions	4-4
	Identifying Affected Shipments	4-4
	Compiling Data on Current Demand	4-5
	<i>Scope and Structure</i>	4-5
	<i>Coverage of Commodity Characteristics</i>	4-9
	<i>Coverage of Origin/Destination Characteristics</i>	4-11
	<i>Coverage of Shipment Characteristics</i>	4-11
	<i>Coverage of Transport Characteristics</i>	4-14
	Projecting Demand for Analysis Time Period	4-20
4.3	Estimating How Policies Affect Costs and Other Service Characteristics	4-20
	Translating Policies into Cost Impacts: A General Framework	4-21
	ABC Costing and Identification of Cost Drivers	4-23
	Cost Estimating Procedures	4-24
4.4	Estimating Changes in Demand Due to Policies	4-24
	Rail/Truck Diversion	4-25
	Barge/Rail Diversion	4-27
4.5	Case Study: Truck Size and Weight Policy	4-27
5.0	Strategic Planning for Freight Transportation	5-1
5.1	Overview of the Strategic Planning Process for Freight Transportation	5-1
	Brief History	5-1
	Outline of the Generic Strategic Planning Process	5-2
	Differences Between the Public and Private Sector	5-7
5.2	Role of Demand Information and Forecasts	5-7
	San Francisco Bay Area Seaport Plan	5-9
	Strategic Motor Freight Planning Model for the Chicago Area	5-10
	Freight Flow Databases for Statewide Strategic Freight Transportation Planning	5-10

Table of Contents

(continued)

5.3	Examples of Other Strategic Planning Experience in State DOTs and MPOs	5-16
5.4	Case Study: Strategic Assessment for the San Francisco Bay Area Seaport Plan	5-21
	The Development of the Seaport	5-21
	Institutional Framework	5-22
	Description and Evaluation of Issues	5-22
	Development of Recommendations	5-27
Appendix A. Factors Influencing Freight Demand		A-1
A.1	Factors that Affect Demand Directly	A-1
	The Influence of the Economy	A-1
	Industrial Location Patterns	A-4
	Globalization of Business	A-5
	International Trade Agreements	A-7
	Just-in-Time Inventory Practices	A-8
	Centralized Warehousing	A-9
	Packaging Materials	A-10
	Recycling	A-10
A.2	Factors that Affect Demand Though Their Influence on Costs and Service	A-11
	Economic Regulation and Deregulation	A-11
	International Transportation Agreements	A-15
	Intermodal Operating Agreements	A-17
	Single-Source Delivery of International LTL Shipments	A-19
	Carrier-Shipper Alliances	A-19
	Fuel Prices	A-20
	Publicly Provided Infrastructure	A-22
	User Charges	A-23
	Other Taxes	A-25
	Government Subsidization of Carriers	A-26
	Environmental Policies and Restrictions	A-27
	Safety Policies and Restrictions	A-29
	Effects of Changes in Truck Size and Weight Limits	A-31
	Congestion	A-34
	Technological Advances	A-35

Table of Contents

(continued)

Appendix B. Reviews of Freight Demand Forecasting Studies.....	B-1
B.1 General Overview of Freight Demand Planning: Policy Issues to Be Addressed.....	B-2
B.2 The Structural Approach: Freight Planning Patterned After the Urban Planning Process - Trip Generation, Trip Distribution, Mode Choice, and Route Assignment.....	B-3
1. Overview of Similarities between Freight and Urban Planning.....	B-3
2. Trip Generation and Trip Distribution.....	B-5
3. Mode-Split/Mode Choice.....	B-12
4. Network Assignment.....	B-18
B.3 The Direct Approach: Micro and Facility Related Planning.....	B-21
Appendix C. Database Descriptions	C-1
Appendix D. Overview of Freight Transportation Survey Procedures and Methods.....	D-1
Appendix E. Statistical Forecasting Techniques.....	E-1
E.1 Regression Analysis.....	E-2
Ordinary Least Squares Regression	E-3
Model Specification and Testing	E-4
Violating the OLS Assumptions	E-6
Forecasting with an OLS Model	E-11
E.2 Exponential Smoothing.....	E-12
E.3 Leading Indicator Regression.....	E-14
Selecting a Lead Variable.....	E-14
Determining Lead Time.....	E-15
Adjusting for Autocorrelation	E-16
E.4 ARIMA Modeling	E-17
ARIMA Parameters	E-17
Steps in Using ARIMA.....	E-19
E.5 Intervention Analysis	E-20
E.6 Seasonal Decomposition and Weighted Least Squares Regression.....	E-21
Estimation of Seasonal, Trend, Cyclical, and Error Components.....	E-22
Seasonal Adjustments with Dummy Variables.....	E-23

Table of Contents

(continued)

Use of Weighted-Least Squares to Adjust for Heteroscedasticity.....	E-23
Advanced Methods for Seasonal Adjustments	E-24
E.7 Other Software Packages	E-25
Appendix F. Estimating Transport Costs	F-1
F.1 Truck Costs.....	F-1
Adjustment for Inflation	F-2
Software Packages	F-6
F.2 Railroad Rates and costs	F-8
Software Packages	F-8
A Software Package.....	F-8
F.3 Water Transport	F-11
Types of Operation	F-11
Cost Elements	F-12
Cost-Estimating Methods	F-16
Typical Costs.....	F-17
F.4 Air Transportation	F-20
Appendix G. Rail/Truck Modal Diversion	G-1
G.1 The Effects of Changes in Truck Costs.....	G-2
Cross Elasticities from the ICM	G-2
Cross Elasticities from the CN and CP	G-6
Conclusions.....	G-7
G.2 The Effects of Changes in Rail Rates and Rail Costs.....	G-9
G.3 Freight Demand Elasticity Studies: Technical Considerations.....	G-12
Appendix H. Three Modal-Diversion Models	H-1
H.1 The Intermodal Competition Model	H-1
H.2 The T-R/R-T Diversion Model.....	H-3
H.3 The 1,000 - Mile Strategic Choice Model	H-6

