MNLモデル、NLモデルを用いた横浜市現状把握

Understanding of Current Condition in Yokohama using MNL and NL Models

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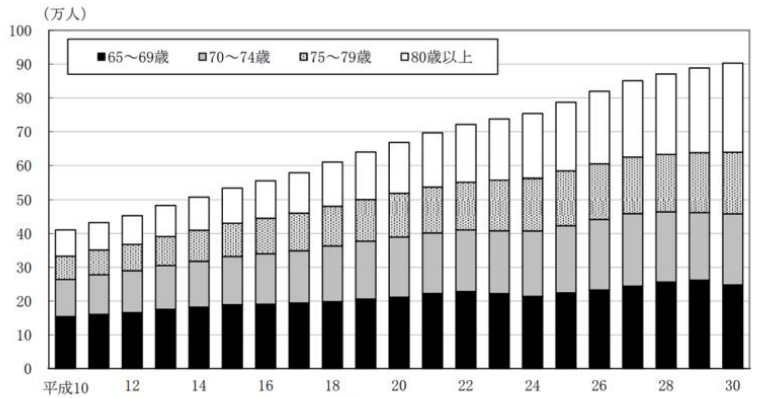
背景(Background)

◆ 超高齢化社会や将来の人口減少社会に対応できる「集約型都市構造」への転換

Conversion to an "intensive urban structure" that can respond to an aging society and future population declining society

◆ 誰もが移動しやすく，環境にやさしい交通の実現

Realization of environmentally friendly traffic and easy movement



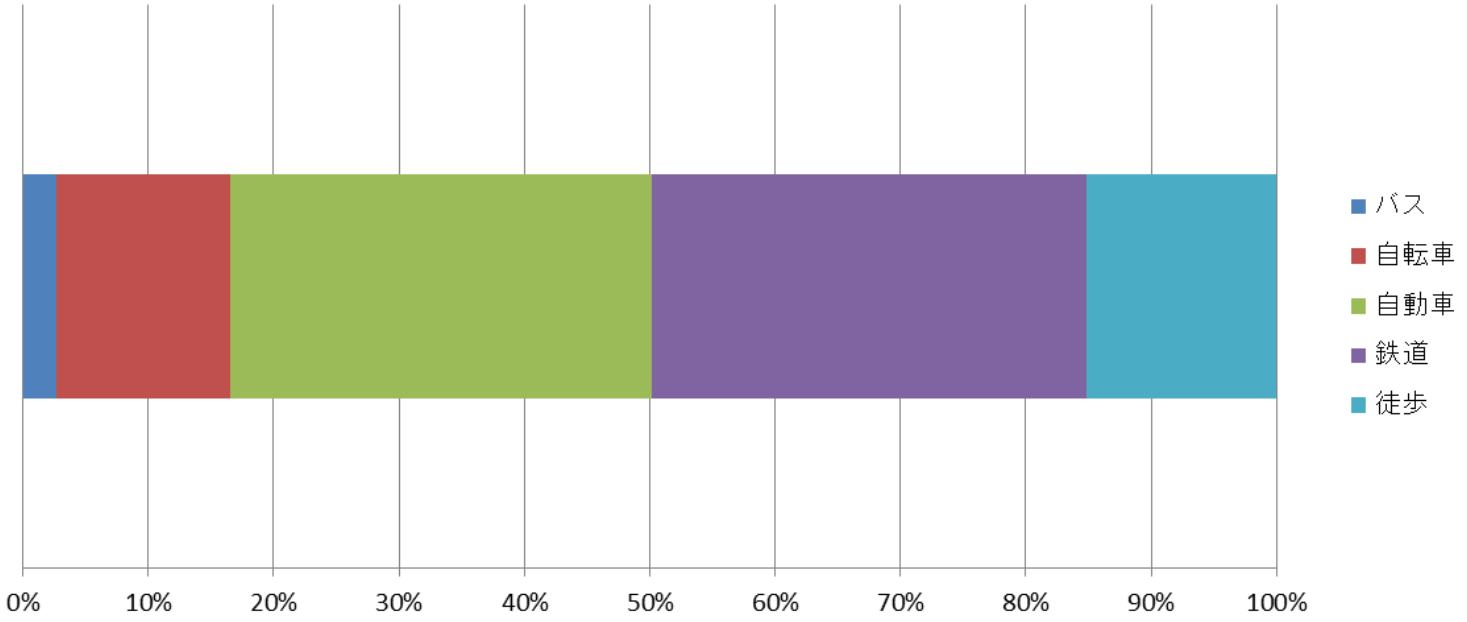
(H25横浜市都市計画マスタープランより)

図1:65歳以上の人口推移(H10～H30)

参照:横浜市統計ポータルサイト

基礎分析(Basic analysis)

◆交通手段別シェア Share of transportations



自動車の利用率が高い High automobile usage rate

→公共交通機関への利用促進　Promotion of use for public transportation

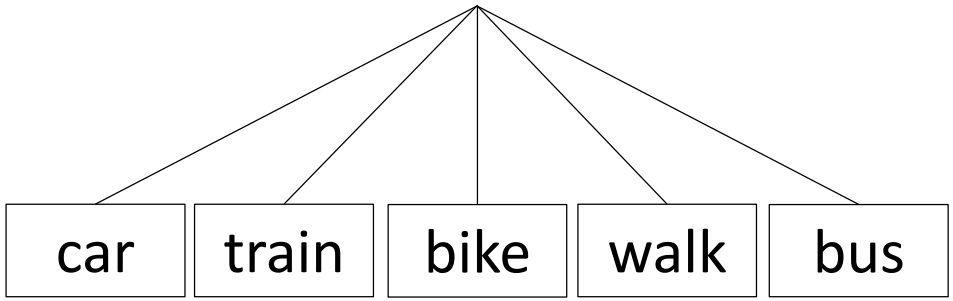
モデル案（Modeling plan）

◆効用関数（Utility Function）

$$U_{car} = V_1 + \varepsilon_1 = \beta_1(travel\ time) + b_1 + \varepsilon_1$$
$$U_{train} = V_2 + \varepsilon_2 = \beta_1(travel\ time) + \beta_2(cost) + \beta_3(access\ distance) + b_2 + \varepsilon_2$$
$$U_{bike} = V_3 + \varepsilon_3 = \beta_1(travel\ time) + b_3 + \varepsilon_3$$
$$U_{walk} = V_4 + \varepsilon_4 = \beta_1(travel\ time) + b_4 + \varepsilon_4$$
$$U_{bus} = V_5 + \varepsilon_5 = \beta_1(travel\ time) + \beta_2(cost) + \beta_3(access\ distance) + b_5 + \varepsilon_5$$

◆選択確率（Choice Probability）

$$P_{in} = \frac{e^{V_{in}}}{\sum_{j=1}^{5} e^{V_{jn}}}$$



モデル推定結果(The result)

	parameter	t value	
Constant_train	0.075	0.6	
Constant_bike	0.182	1.9	
Constant_walk	1.421	12.3	**
Constant_bus	-24.144	-0.1	
travel time	-0.093	-17.0	**
cost_train	0.000	1.3	
cost_bus	0.114	0.1	
accessdis_train	-0.001	-10.1	**
accessdis_bus	-0.003	-2.9	**
Final log-likelihood	-1520.05		
Likelihood ratio	0.2776		

(**:1%有意)

MNL

	parameter	t value
Constant_train	-0.357	-0.8
Constant_bike	-16.190	0.0
Constant_walk	0.896	2.2*
Constant_bus	-19.135	0.0
travel time	-0.032	-3.9**
cost_train	0.001	1.6
cost_bus	0.105	0.0
accessdis_train	-0.001	-4.6**
accessdis_bus	-0.001	-0.7
sex_car	3.231	10.7**
sex_train	2.767	8.0**
sex_bike	0.546	0.7
sex_walk	3.013	9.1**
purpose_car	-1.364	-2.4*
purpose_train	-0.343	-0.6
purpose_bike	-0.930	-1.2
purpose_walk	-1.708	-2.5*
weekday_car	0.828	1.8
weekday_train	3.068	5.9**
weekday_bike	21.210	0.0
weekday_walk	0.828	1.7
Final log-likelihood	-285.20	
Likelihood ratio	0.8553	

MNL

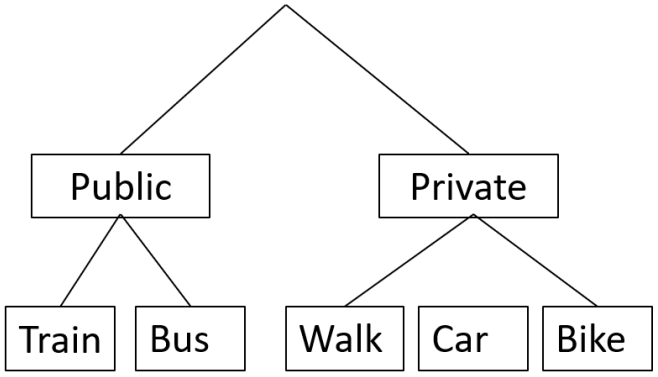
	parameter	t value
Constant_train	0.096	0.2
Constant_bike	-0.860	-1.9
Constant_walk	-0.293	-0.8
Constant_bus	-19.663	0.0
cost_car	0.000	0.3
cost_train	0.002	2.9**
cost_bus	0.109	0.0
accessdis_train	-0.001	-2.8**
accessdis_bus	-0.001	-0.7
sex_car	4.385	13.5**
sex_train	4.543	12.1**
sex_bike	3.763	8.8**
sex_walk	3.542	10.2**
urban_car	0.000	-2.1*
urban_train	0.001	0.7
urban_bike	-0.283	-0.6
urban_walk	0.285	0.6
egressdis_train	1.340	2.0*
egressdis_bus	1.589	2.9**
Final log-likelihood	-339.97	
Likelihood ratio	0.8304	

MNL

	parameter	t value
Constant_train	0.230	0.5
Constant_bike	-0.871	-2.0
Constant_walk	-0.322	-0.8
Constant_bus	-21.424	0.0
cost_car	0.000	0.4
cost_train	0.002	2.6**
cost_bus	0.114	0.0
accessdis_train	-0.001	-2.9**
accessdis_bus	0.000	-0.3
sex_car	4.091	16.5**
sex_train	4.542	16.1**
sex_bike	4.317	14.6**
sex_walk	4.241	16.7**
egressdis_train	-0.001	-2.3*
egressdis_bus	0.002	1.3
Final log-likelihood	-346.05	
Likelihood ratio	0.8294	

NL

	Parameter	T value	
Constant_train	-1.89	-3.2	**
Constant_bike	-11.2	-0.9	
Constant_walk	-0.288	-0.7	
Constant_bus	-1.42	-2.7	**
travel time	-0.052	-6.6	**
cost_train	-0.001	-1.4	
cost_bus	0.063	1.0	
accessdis_train	-0.001	-6.2	**
accessdis_bus	-0.001	-0.9	
gender_train	5.64	15.6	**
gender_car	3.46	12.3	**
gender_bike	4.07	11.0	**
gender_walk	3.83	11.4	**
Scale parameter	1.05	10.5	**
Final Likelihood	-347.45		
Likelihood Ratio	0.8608		



(**:1%有意)

Elasticity values