名古屋大学
NAGOYA UNIVERSITY

Yokohama..
Future Compact City

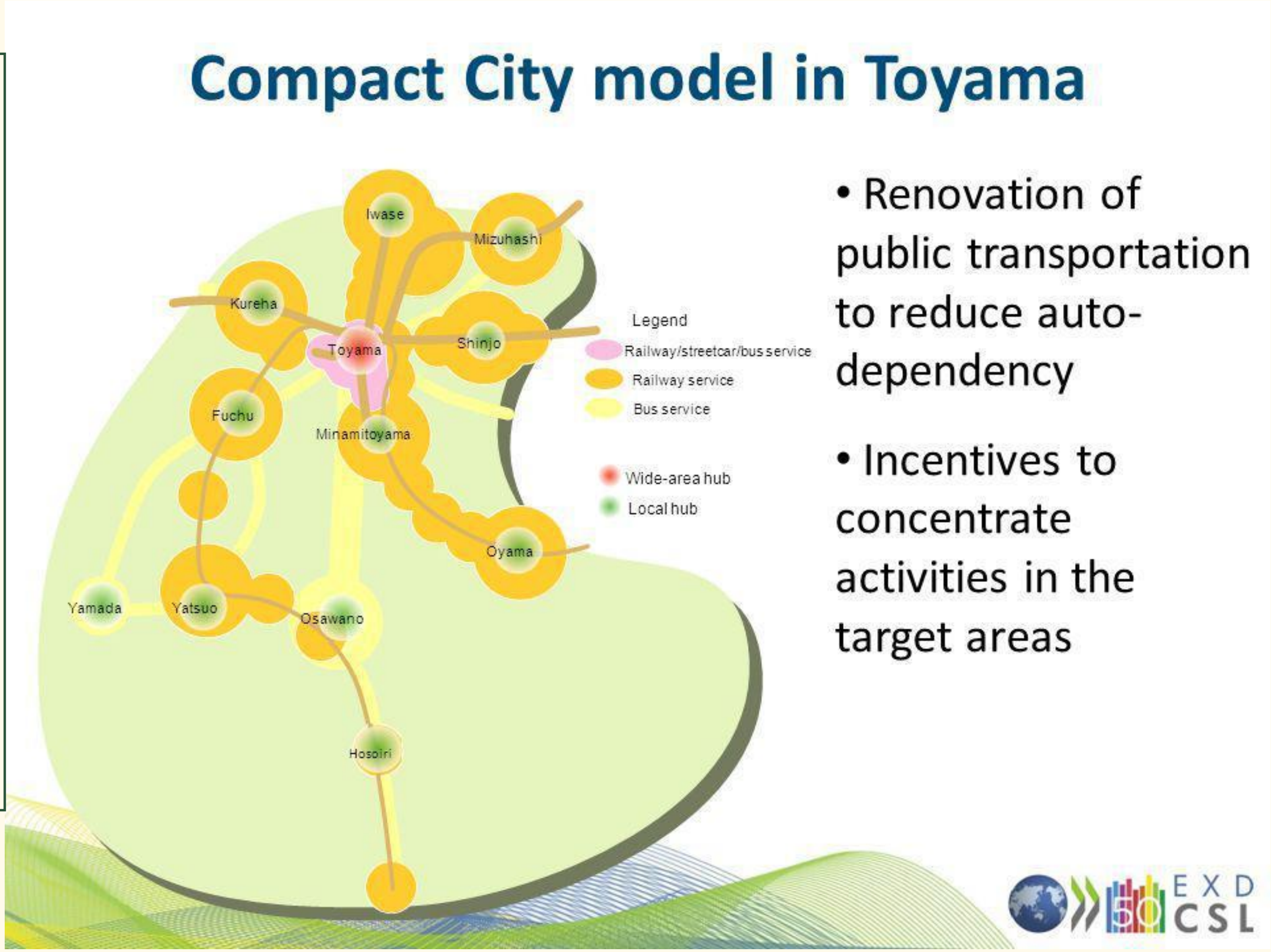
Team J

Khan
Trang
Xiong
Zamzam

What is Compact City?

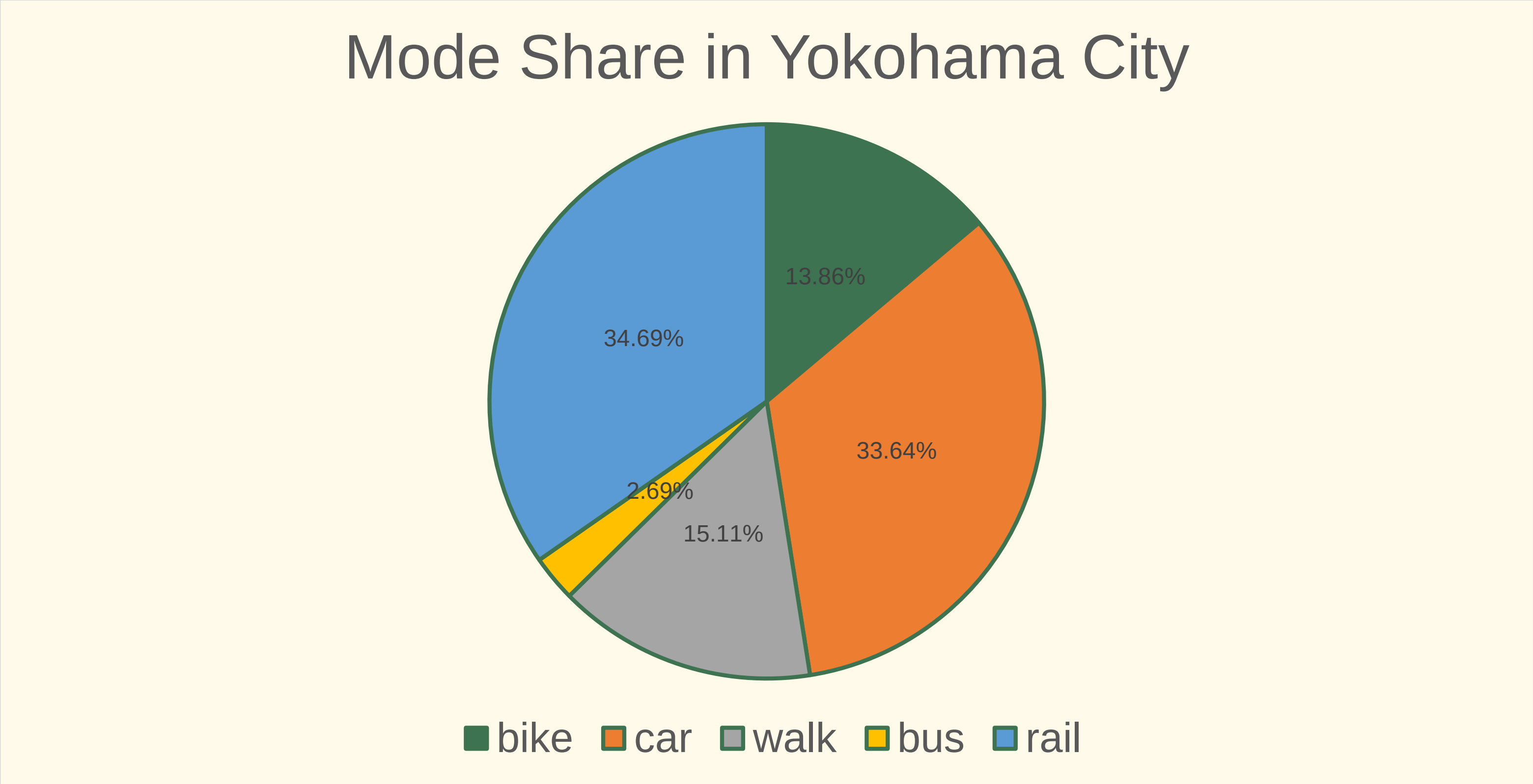
Compact city:

- ✓High residential density with mixed land use
- ✓Better mobility
- ✓Less impact on environment



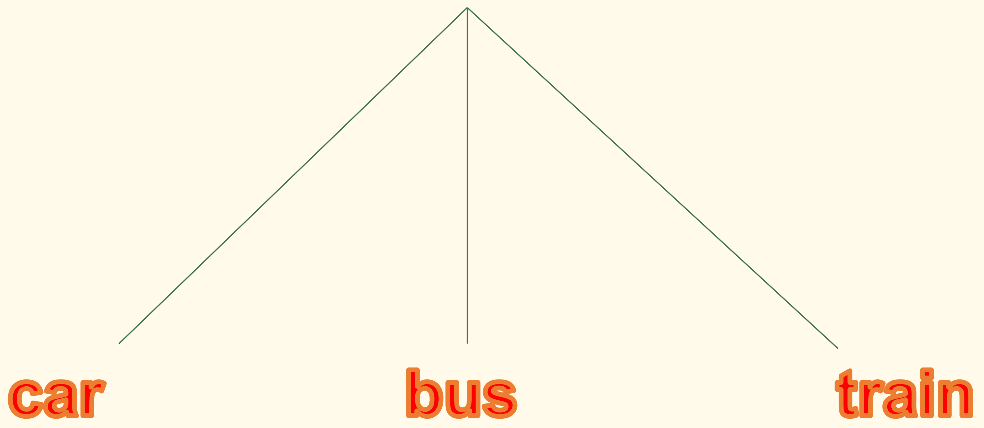
Why CompactcityinYokohama?

- **Population**： Over 3.7 million
- **Area**： over 168 square miles,
- **Density**： 22,103 people per square mile



Mode Estimation

- **Model 1**: Less than 10 km
- **Model 2**: More than 10 km
- **Aim**: To investigate how the distance would affect mode choice



Model Estimation

$$V_R = \beta_1 + \beta_3 Ac_R + \varepsilon_R$$
$$V_B = \beta_2 + \beta_4 Ac_B + \varepsilon_B$$
$$V_C = \beta_4 Ac_B + \beta_5 Td + \varepsilon_C$$

- R：rail
- B：bus
- C：car
- Ac：Acess time
- Td：Trip duration

Estimation Result

RGui (32-bit) - [R Console]

File Edit View Misc Packages Windows Help

```
> Data <- read.table("C:/Users/Phan Thu Trang/Downloads/Summer school 2018/Long distance.txt")
> colnames(Data) <- c("Mode_choice", "Trip_duration", "Avail_R", "Access_R", "Avail_B", "Access_B")
> ## Count the number of data rows
> hh <- nrow(Data)
> ## Set the initial values of the parameters (the number in parenthesis corresponds to the number of parameters to be estimated)
>  b0 <- numeric(4)
>  b0 <- c(1,1,1,1)
> ## Recall that we estimate parameters by maximizing the log-likelihood function, hence we first need to define that function
>
> ##### Define the log-likelihood function of the logit model#####
>
> fr <- function(x) {
+
+   ## declare the log-likelihood variable, set value to 0
+   LL = 0
+
+   ### For this choice problem, we consider the following 3 modes
+   ## rail
+   ## bus
+   ## car
+
+   ## calculate the utility function: :introduce the desired explanatory variables in the function
+
+   train <- Data$Avail_R * exp(x[1]*matrix(1,nrow = hh,ncol = 1)+ x[3] * Data$Access_R)
+   bus <- Data$Avail_B * exp(x[2]*matrix(1,nrow = hh,ncol = 1)+ x[3] * Data$Access_B )
+   car <- exp(x[3] * Data$Access_B + x[4] * Data$Trip_duration)
+   ### Calculate the choice probabilities
+   ## calculate the Inclusive Value (the denominator of the choice probabilities equation)
+   deno <- (car + train + bus)
+
+   ## Calculate indiviudal choice probabilities
+   Ptrain <- Data$Avail_R * (train / deno)
+   Pbus   <- Data$Avail_B * (bus / deno)
+   Pcar   <- 1 * (car / deno)
+
+   ## Avoid problems stemming from choice probabilities becoming zero.
+   Ptrain <- (Ptrain !=0) * Ptrain + (Ptrain == 0)
+   Pbus   <- (Pbus !=0) * Pbus     + (Pbus == 0)
+   Pcar   <- (Pcar !=0) * Pcar   + (Pcar == 0)
+
+   ## Choice results
```

ENG 12:21 PM

Estimation Result

RGui (32-bit) - [R Console]

File Edit View Misc Packages Windows Help

```
+   ## Choice results
+   Ctrain    <- Data$Mode_choice == 200
+   Cbus      <- Data$Mode_choice == 240
+   Ccar      <- Data$Mode_choice == 100
+
+   ## Calculate the Log-likelihood function
+   LL <- colSums(Ctrain*log(Ptrain) + Cbus*log(Pbus) + Ccar  *log(Pcar))
+   return(LL)
+ }
> ##### Maximize the Log-likelihood function#####
>
> ##Parameter optimization
> res <- optim(b0,fr,gr=NULL, method = "Nelder-Mead", hessian = TRUE, control=list(fnscale=-1))
Error in optim(b0, fr, gr = NULL, method = "Nelder-Mead", hessian = TRUE,  :
  function cannot be evaluated at initial parameters
>
> ## Parameters and Hessian matrix calculation
> b   <- res$par
Error: object 'res' not found
> hhh <- res$hessian
Error: object 'res' not found
>
> ## Calculate the t-statistic
> tval <- b/sqrt(-diag(solve(hhh)))
Error: object 'b' not found
>
> ## L(0), Log-Likelihood when all parameters are 0
> L0 <- fr(b0)
> ## LL, maximium likelihood
> LL <- res$value
Error: object 'res' not found
>
> ##### Output #####
> print(res)
Error in print(res) : object 'res' not found
> ## t-statistic
> print(tval)
Error in print(tval) : object 'tval' not found
> ## L(0)
> print(L0)
[1] NA
```

ENG 12:21 PM

Policy Simulation

- Compact City policies:

➢ Public-Private Partnership
➢ Urban growth boundary (contain outward growth)
➢ Polycentric compact city pattern