اللجنة الأكاديمية للهندسة المدنية

دفتر

مواصلات

لانا عدنان

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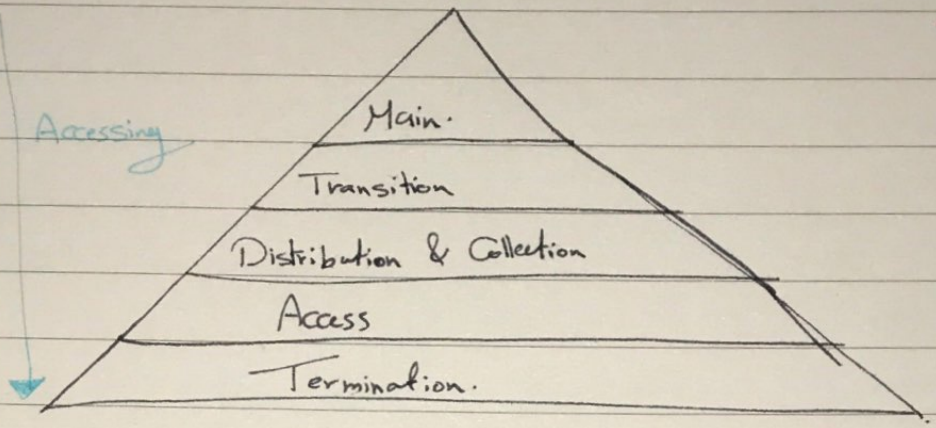
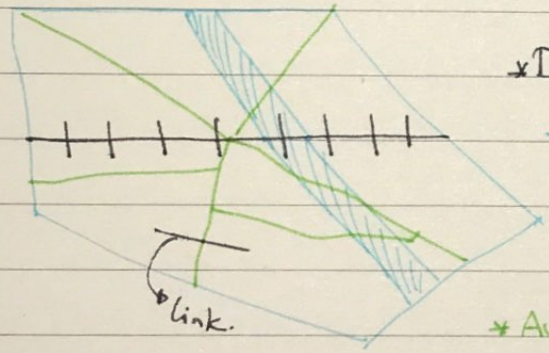
* Hierarchies of movement :



* تصنيف الطرق بالأردن :

1- Primary. 2- Secondary. 3- Village.



* Divide into smaller ~~area~~ :
- Administrative boaders.
- locality.
- Neighborhoods (TAZ) Traffic analysis Zone.

* Avoid creating TAZ inside TAZ.*

(UTP)) : Coding & Zoning :

* Elements that should be considerd when dividing into TAZ's :

① Man-Made feature : freeways, bridges, railway, & express way.
② Natural feature :
③ Different land use.
④ Socio-Economic chart : Income, Auto ownership.

* Each TAZ should be homogenous characteristic based on provide element. to :

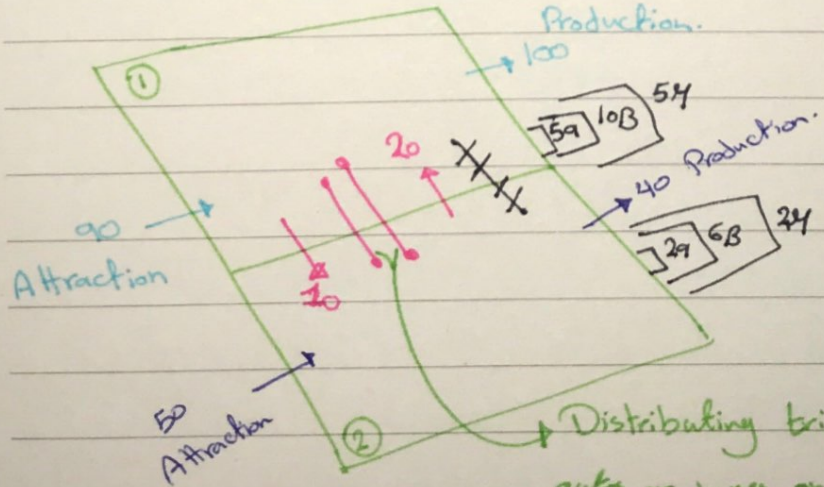
- Minimize internal intend trip inside each TAZ.

In general a TAZ should have a population 1000 inhabitant & job.

((UTP)): OD Surveys :

- Field surves (Data inventory).
- Questionnaires
  - Social-economic charachteristics of trip maker.
    - Age, gender, Income (HH), Family size, jobs, auto ~~owned~~ owned (HH).
  - Trip Characteristics.
    - Origin, destination, travel time (direct, indirect), Cost (trip), trip purpose
      - Home-Based-Work. [HBW]
      - Home-Based-other. (shop, education ... etc). [HBO]
      - Non-Home-Based. [NHB]

((UTP)): Forecasts ($\Sigma A_i = \Sigma P_i$).



a: autos.

B: Buses.

M: Metro.

Distributing trips that uses either of autos or buses on route 1 &/or 2 taking into consideration capacities & congetion.

1- Trip generation :

For all TAZ's in the study area.

Σ Production & Σ Attraction should be computed (trip/day) {daily}.

For study area : $\sum_{i=1}^{n} P_i = \sum_{j=1}^{n} A_j$

* Note :

It's not wrong to have different production & attraction for the same TAZ.

* دائماً بفاضل نقلل عدد الـ TAZ لإن كل ما زادت بتزيد صعوبة الحسابات وبتسبب بطئ

from point 5 to 8 ⟹ should be performed for all ~~available~~ available alternatives.

Ex 12.2 :

Production / Trip purpose

HH's = 60 — No. HH's (Fig 12.2) — Autos (Fig 12.3) — Avg. daily trips (Fig 12.4)

* Low (L) : 60 * 9%
  - 0 → * 54% → * 1
  - 1 → * 42% → * 6
  - 2+ → * 4% → * 7

* Medium (M) : 60 * 40%
  - 0 → * 4% → * 2
  - 1 → * 58% → * 8
  - 2+ → * 38% → * 13

* High (H) : 60 * 51%
  - 0 → 2% → * 3
  - 1 → 30% → * 11
  - 2+ → 68% → * 15

Σ → HBW * 17%, HBO * 32%, NHB * 51%

Trip purpose (Fig 12.5)

* Cross Clasification can also be used to calculate trip attraction. However, trip rate is usually used to calculate trip attraction.

Ex 12.3 : At the end of trip generation step, you should check that for the study area, the following is valid:

$$\sum_{i=1}^{n} P_i = \sum_{j=1}^{m} A_j$$

otherwise, then you should calibrate.

* Gravity Model :

given:

ΣP_1 = ΣP_i } From trip generation step.

ΣP_2

ΣA_1 = ΣA_j

ΣA_2

$$T_{ij} \propto \frac{A_j}{f(\text{travel time})}$$

O \ D	1	2	Σ
1	T_{11}	T_{12}	P_1 } calculated, should be equal to values calculated from step 1 using gravity model.
2	T_{21}	T_{22}	P_2
Σ	A_1	A_2	ΣP_i / ΣA_j

A_1, A_2 calculated → Can be different than the values calculated in step 1, if so; you should calibrate (if possible).

* If when differences between given & calculated attractions, the following should be valid:

$\Sigma Pro.\ given = \Sigma Pro.\ calc.$

$\Sigma Attraction\ given = \Sigma Attraction\ calc.$

Ex 12.4:

First iteration: Singly constrained O-D Table:

O \ D	1	2	3	Comp. ΣP_i
1				140
2				
3				
Comp. ΣA_j	379			

given → 300

* given: $P_1 = 140$, $P_2 = 330$, $P_3 = 280$ → ما بصير يكون في فرق

$A_1 = 300$, $A_2 = 270$, $A_3 = 180$

* given & comp. Production for each Zone should be equal.

* given & comp. Attraction could have difference for the same Zone.

* هامش الخطأ يكون بنسبة 5% .

T_{11} = back to slides. «ما تقرب الأرقام إلا بالنهاية».

بيجي ↳ T_{12}, T_{13} ... etc.

$error = \frac{270-210}{270} * 100 \leq 5\%$

↳ stop. unless otherwise requested.

$$A_{ijk} = \frac{A_j}{C_{j(k-1)}} * A_{j(k-1)}$$

A_j ← given attraction for zone (j).

$A_{j(k-1)}$ ← Adjusted attraction from previous iteration.

$C_{j(k-1)}$ ← Comp. attractions from previous iteration.

k: no. of iteration.

* For the first iteration adjusted attraction = Given attraction

*Adjusted Attraction for k=2.

Zone 1: $A_{12} = \frac{A_1}{C_1} * A_{11} = \frac{300}{379} * 300 = 237$

Zone 2: $A_{22} = \frac{A_2}{C_{21}} * A_{21} = \frac{270}{210} * 270 = 347$

Zone 3: $A_{32} = \frac{A_3}{C_{31}} * A_{31} = \frac{180}{161} * 180 = 201$

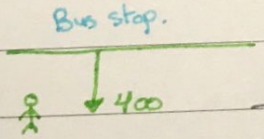
2nd iteration:

$$T_{11} = 140 * \frac{237 * 39}{(237*39)+(347*52)+(201*50)} = 303$$

k=3:

$$A_{13} = \frac{300}{303} * 237$$

⋮ etc.



→ المسافة القريبة (Short distance).

المسافة البعيدة.

* Note: In slide 159

لو كان Travel Time متساوي بالبين، نروح للأقل Volume، لو كانوا متساوين برضو فما في فرق.

Ex 12.9 :

$I = 1\ NVTT + 2.5 + \text{excess time} + 3 * \frac{\text{Cost}}{\frac{\text{Income}}{120{,}000}}$

* Trip generations:

- Calculate the probility (percentage) of having the following no. of daily HBW trips between zone i & j :

a. $T_i = 5 \rightarrow P(T_i = 5) = \frac{e^{-\lambda} * \lambda^5}{5!}$

b. $T_i < 3 \rightarrow P(0) + P(1) + P(2)$

c. $T_i \geq 3 \rightarrow 1 - (\ \downarrow\ )$

d. $3 \leq T_i < 7 \rightarrow$ [illegible]

* $P(T_i = 10)$

Purpose ↓ ↳ No. of Fraction of trips.

* $\lambda = e^{\text{linear equ.}} \rightarrow \lambda = e^{T_i = b_0 + b_1 z_1 + b_2 z_2 + \cdots + b_n z_n}$

↳ Avg. no. of daily trips (Expected # trips).

* Trip distributions:

- Gravity : $T_{ij} = P_i * \frac{A_j * F_{ij} * k_{ij}}{\sum_j A_j * F_{ij} * k_{ij}}$ (More accurate).

- Growth factor models :

↳ Factor Methods

Ex 12.6 :

- 1st Iteration:

T_{AB} = ... (back to slides).

$$T_{BA} = t_B * G_B * \frac{t_{BA} * G_A}{t_{BA} * G_A + t_{BC} G_C + t_{BD} G_D} = 411 \text{ trips/day.}$$

Then take the avg.

- 2nd Iteration:

$$T_{AB} = 693 * 1.04 * \frac{428 * .96}{(428 * .96) + (141 * 1.04) + (124 * .94)}$$

$$t_{AB} * G_A * \frac{t_{AB} * G_B}{(t_{AB} * G_B) + (t_{AC} * G_C) + (t_{AD} * G_D)}$$

Zone	A	B	C	D
A	-	425	158	121
B	425	-	371	-
C	158	371	-	420
D	121	-	420	-
t_i	704	796	949	541
T_i	720	770	980	520

* Avg. growth factor example:

- 2nd Iteration (After performing):

$T_A = 281.43$

$T_B = 807.86$

$T_C = 865.29$

$T_D = 444.92$