FIG Working Week 2007
Strategic Integration of SURVEYING SERVICES
同心共策 測量服務
Hong Kong SAR 13-17 May 2007
THE HONG KONG INSTITUTE OF SURVEYORS
香港測量師學會

AN IMPLEMENTATION OF NOMINAL ASSET BASED LAND READJUSTMENT

by

Tahsin YOMRALIOGLU
Recep NISANCI & Volkan YILDIRIM

Karadeniz Technical University, GISLab, Trabzon - TURKEY

Strategic Integration of Surveying Services, FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

What is LR ?

Land Readjustment (LR) is a crucial planning tool in order to provide new settlement lands in urban and rural areas.

It is an effective method to transform irregularly shaped cadastral parcels to appropriate plots that can be used in more economical manner.

What is LR ?

process…
all land parcels within a project area are grouped together and a percentage of each land parcel calculated to determine a contribution to public areas. This percentage depends on the size of the project area and the total size of required public-use areas. The remaining land is then reallocated within the blocks defined by the plan

---

Objectives of LR…

Land readjustment aims to manage existing land structure when a systematic urban land development is required. The main objectives of a land readjustment project may be given as follows:

Development of new urban sites

Redevelopment of an already urbanised area

Improvement and expansion of public facilities

Disaster rehabilitation

LR is often used by municipalities in order to provide new built-up areas for urban development needs.

Using this method, available zoning plans are reflected on to land and new lots are created in a short time.

Issues of LR ?

* Information management

* Decision-Making

* Land valuation ?…

for example, has not been dynamically involved in the entire process...

Many substantial criteria which may affect a land parcel's value can ignored during the process…

As a result of this, inequitable land distribution occurs to the original landholders so that their benefits differ from the project…

Nominal Land Valuation Method…

Using the comparison method of valuation, physical, legal and market factors can be compared directly but every property are spatially unique, so spatial factors requiring an alternative method of adjustment.

• The value of property reflects its capacity to fulfill a function. With regard to commercial property, functional qualities may include,

• Location influences (accessibility to the market place, proximity to suppliers of raw materials and important nodes such as railway stations, car parks and open spaces)

• Physical attributes (size, shape, age and condition)

• Legal factors (lease terms and restrictive covenants)

• Planning and economic factors (planning constraints, permitted use and potential for change of use).

Slide 1

Nominal Land Valuation Method…

Nominal values of property can be calculated in a parametric way instead of definite value.

Objective and subjective criteria selected for this aim are evaluated one by one.

**Then, doing in a unit area or volume, these evaluations are reflected to all land parcels.**

MAXIMUM VALUE LEVEL

% 100 / 80 / 60 / 40 / 20 / 0

Land Parcels

Slide 2
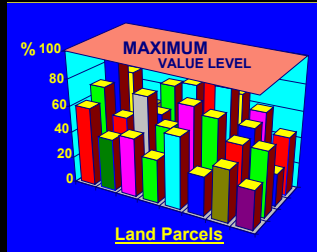
Land valuation factors which may affect a land parcel value

1) Supplied basic services
2) Permitted number of floors
3) Permitted construction area
4) Landscape, view
5) Access to street
6) Environment
7) Parcel location within block
8) Street frontage
9) Distance from nuisances
10) Land parcel shape
11) Currently usable area
12) Distance to city centre
13) Distance from noise
14) Soil condition
15) Distance to educational centres
16) Distance to health services
17) Access to highway
18) Distance to shopping centre
19) Available utilities
20) Distance to recreational areas
21) Topography
22) Distance to religious place
23) Distance to play garden
24) Distance to car parking area
25) Distance to fire station
26) Access to waterway
27) Distance to police station
28) Access to railway

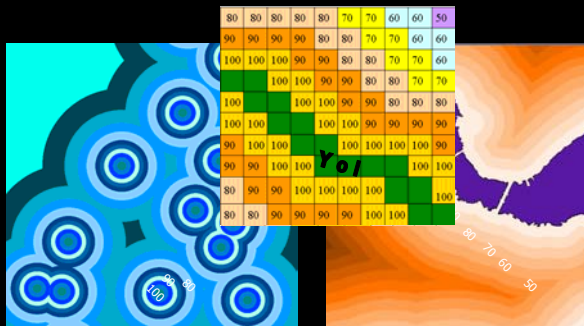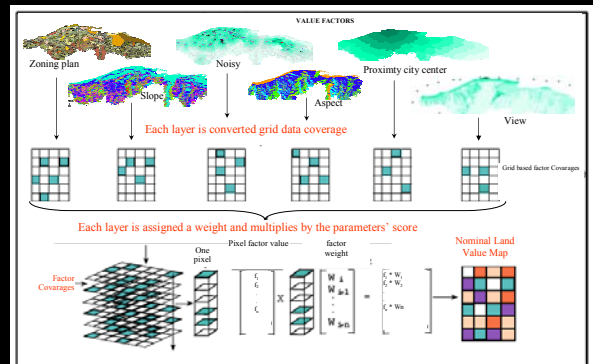$$V_i = AREA_i * \sum_{i=1}^{n} (P_i * W_i)$$

where;
V: Total nominal asset value of a land parcel
P: Factor value
n: Total number of factors

Area: Land parcel size (or pixel size)
W: Factor weight

Slide 3
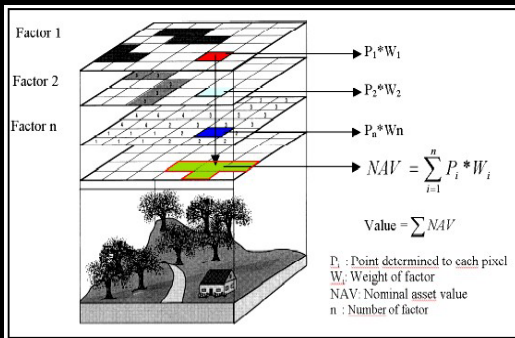
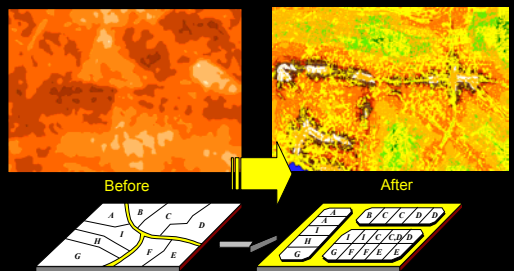Calculation of a nominal asset value on a pixel-base.

Slide 4

The Spatial analysis process of creating the raster based land value map by GIS

Slide 5

Distance to noise

Distance to coastline

Slide 6

The main objective here is to give back a new parcel to a landowner with the same value that owned before the project.

Before

After

$$\sum_{i=1}^{n} V_{(BEFORE)} = \sum_{i=1}^{m} V_{(AFTER)\,i}$$

4. EXAMPLE

The sample study area selected for this study is in the city of Trabzon which is located on the Black Sea coast (Figure 4). Study area is 9.8 hectares with by 105 land parcels. The property map, the land-use plan and topographical maps were digitized. Land ownership records were also included in the database. Then, 19 site blocks were subdivided into 156 land parcels according to the plan's rules. Because of the nature of the LR concept, the total area of all land parcels was reduced to 6.2 hectares with the process. In another words, 3.6 hectares of public-use areas were gained by the contribution of the landowners. Including the previous public-user area of 0.8 hectares a total of 4.4 hectares of land was reserved for public-use after the project.
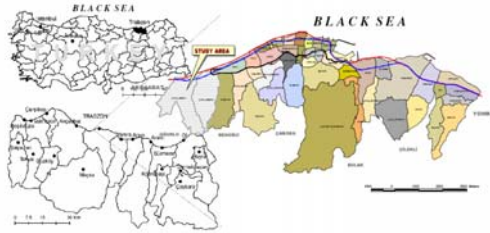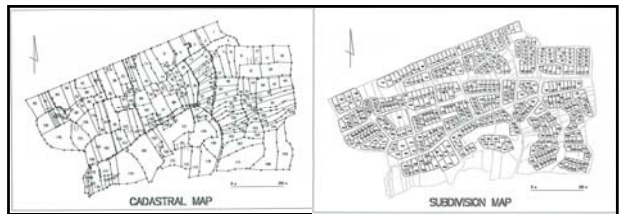

Figure 4. Study Area in Trabzon, Turkey

Table 1. An example of new parcel ownerships in the study area.

Parcel ID	New Parcel ID	Input size: m2	Input value: $	Allocated size m2	Allocated value $	Money balance
500-1	100-1	1,175	21,500	590	16,500	+5,000
500-2	100-2	1,365	25,450	650	15,000	-10,450
500-3	100-3	795	10,900	650	14,900	-4,000
500-4	100-5	900	13,800	650	14,850	-1,050
500-5	100-4	783	15,500	580	15,400	+100
600-1	200-1	1,270	24,850	590	18,000	+6,850
600-2	200-2	480	8,200	650	16,300	-8,100
600-3	200-3	1,185	17,000	650	16,100	+900
600-4	200-2	462	9,000	650	15,900	-6,900
600-5	200-4	765	14,100	580	17,350	-3,250
		160,300			160,300	0

CONCLUSIONS…

❖ To increase the effectiveness of land readjustment method, a nominal asset value-based land readjustment approach has been developed using GIS.

❖ The main objective in this model is to determine the asset value of a land parcel before and after a project, then giving back a new parcel to a landowner with the same value that owned before the project.

❖ Based on the determined nominal asset values, land distribution is accomplished. Using such an approach, the nominal asset value profiles among the landowners are preserved after the project so that the planning effects can therefore be shared similarly by all the landowners who are involved in the project.

❖ The performance of the LR process was increased by the use of raster based GIS functions.

Greetings from Trabzon, TURKEY

Thanks for your listening…

Tahsin Yomralioglu
Karadeniz Technical University, GISLab, Trabzon - Turkey

Vote for
2014 FIG XXV International
Congress in TURKEY

Union of Chambers of Turkish Engineers and Architects
Chamber of Survey and Cadastre Engineers

TURKEY

LET US MEET in
where the Continents are meet…