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Urban regeneration and gentrification:
Land use impacts of the Cheonggye Stream Restoration Project on the Seoul's central business district
by
Heeji Lim, Jeeyeop Kim, Cuz Potter, Woongkyoo
(2013)

Simulating land use change in urban renewal areas:
A case study in Hong Kong
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Urban regeneration and gentrification:
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1. Introduction

2. Literature review

3. Scope and methodology

4. Project Impacts on land use
    1. Redevelopment
    2. Lot-based land use changes
    3. comparison to the Teheran Street CBD

5. More affluent users

6. Conclusion

Urban regeneration and gentrification:
Land use impacts of the Cheonggye Stream Restoration Project on the Seoul's central business district

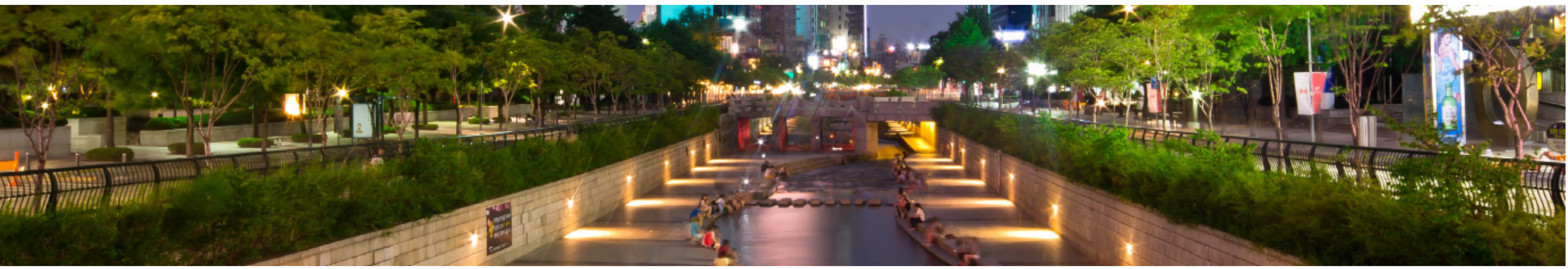
1. Introduction

Content of paper

This paper argues that urban regeneration and gentrification are irreducible(impossible to simplify) views..

The study is aiming to examine how a new large openspace in a city center impacts land use in adjacent areas.

The paper is based on a studio case of 4 big blocks in the Cheonggye Stream Restoration Project in Seoul's CBD (Central Business District), .



a) Cheonggye Stream
http://www.mymodernmet.com/profiles/blogs/seouls-sunken-stone-garden

Urban regeneration and gentrification:
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2. Literature review

Social: Open spaces in the urban environment, is recipes for attracting visitors. Open space is a recreational space that increase light traffic.

Economic: The increasing light traffic, is also a factor, that has a positive impact on retail stores, and gives it a economic boost.

Cities around the world, has created open spaces to regenerate certain areas projects. Examples - The Big Dig, Boston and Highline, Nex York City.

b) Highline, NYC
http://www.timeout.com/newyork/parks/highline

b1) Highline, NYC
http://chelseanow.com

c) Big Dig, Boston
http://walkingbostonian.blogspot.kr/2011/12/big-dig-part-2.html

2. Literature review

The the definition of “Gentrification” has been discussed since the 1980’s.
The broad definition is: “*the production of space for progressively more affluent users*”
by Hackworth

Expanded in 3 ways, and three definitions is found:

1. def - Middle class individuals who buy homes in poorer neighbourhoods for personal consumption.

2. def - Commercial enterprises are considered as gentrifiers.

3. def - Big real estate interests, have replaced and displaced the small housholds’ that, in early times of the era, were responding to market incentives.

- There are a certain similarity between gentrification, and regenerating. They focus on same process, but with two differend point of views.

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3. Scope and Methodology

3.1 Study area

Cheonggye Stream Restoration Project, Seoul's CBD.
The construction were begun in 2003, completed 2005.

The study is limited to 4 blocks of the site
Block and uses:

Block A: Dominated by offices.

Block B: B-1 as commercial district.
with office buildings.
B-2 is dominated by offices(like A).

Block C: C-2, C-3, C-4 maintain industrials.
Like before the renewal.
C-1, and C-2 mix the commercial uses
with B-1.

Block D Transition to industrial uses is completed.

fig. 1. *Study area*

3. Scope and Methodology

3.1 Study area

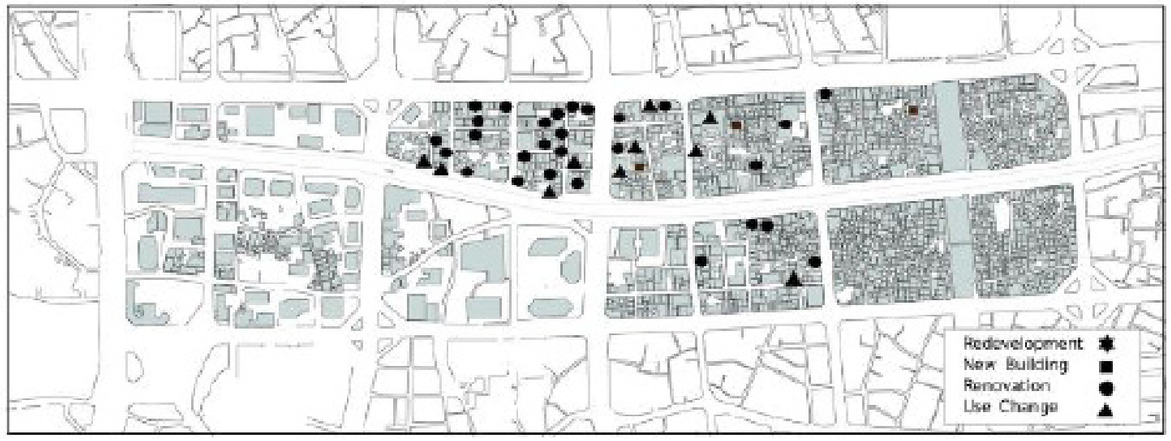

fig. 1a. *Permits issued from 2000 to 2005.*

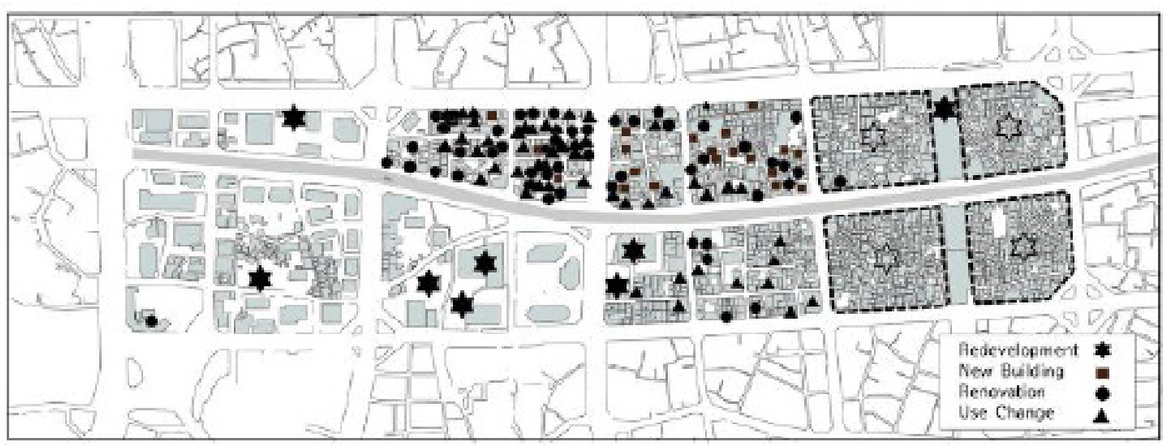

fig. 1b. *Permits issued from 2005 to 2011-*

Table 2
Primary use after land use changes since 2006.

	Office	Educational institute	Commercial	Hotel	Industry	Etc
A	3					
B	28	12	54	3		2
C	13	7	29	7	8	0
D				1		1
Total	**44**	**19**	**83**	**11**	**8**	**3**
	(26.2%)	**(11.3%)**	**(48.2%)**	**(5.9%)**	**(4.7%)**	**(1.7%)**

fig. 1c.

3. Scope and Methodology

3.2 Methodology: Measuring and land use changes

This study of Cheonggye Stream Restoration Project
and the surroundings, is based on data from government records of land use changes.

Land use change permits granted have been collected and studied
from SMG(Seoul Metropolitan Government) archieves, to determine levels of displacement
in the area.

3. Scope and Methodology

3.2 Methodology: Measuring and land use changes

Land use changes in Korea can be separated into two categories:

Lot-based land use changes:
- a. Construction of new building.
- b. Renovation of existinig building.
- c. Only the use itself is changed

Redevelopment:
Constitute major changes for a block.
This requires both a designation of district, and a permission of redevelopment project plan, by the city.

Land use changing patterns:
Permissions is used to record primary use before and after project. The data were categorized: office, commercials, educational, industrial and others.

Method: Dataa of building and redevelopment permits were gathered, to track these type of changes, to data processing.

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4. Scope and Methodology

The project had a major impact on the area:

1. Several redevelopment projects secured resources sufficient to move forward.

2. Number of lot-based land use changes skyrocketed. (especially in blocks B and C)

4.1 Redevelopment

Permits of redevelopments have been intensivated since the projects completion in 2005.

Table 1
Number of land use changes by year.

Redevelopment		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
		0	0	0	0	0	0	0	2	3	1	1	1
Lot-based change	New Building	0	1	3	3	0	3	2	3	1	1	4	2
	Renovation	6	12	12	7	3	3	10	11	4	7	6	9
	Use change	2	5	8	8	5	3	21	19	18	19	10	13
Total		**8**	**18**	**23**	**18**	**8**	**9**	**33**	**35**	**26**	**28**	**21**	**25**

fig. 2. *A clear indicator of the impact the project have had on the site change.*

4. Scope and Methodology

4.2 Lot-bsed land use change

Compared to the cunstruction period (2004-2005) the number of changes inreased 240%
Most changes were in block B-1 and C.

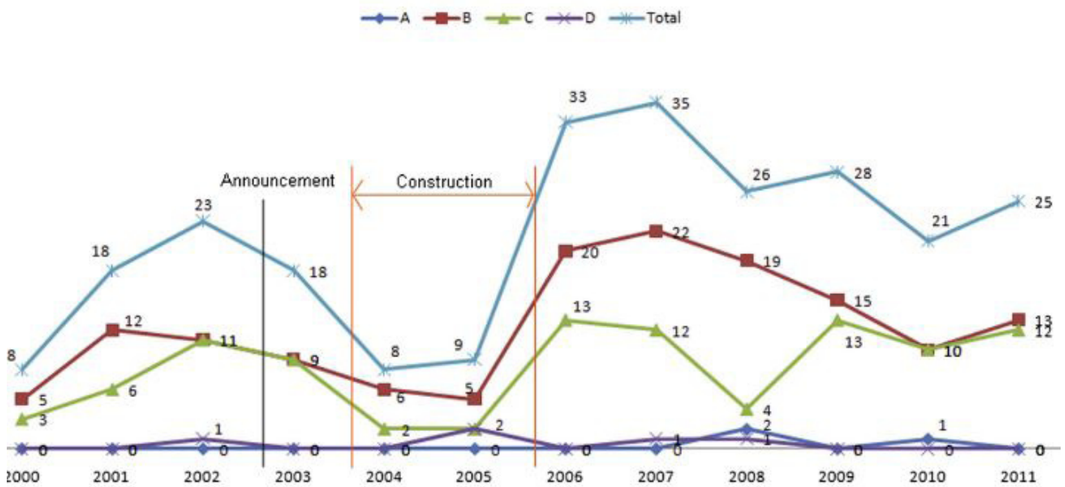

fig. 3a. *Number of land use changes by block.*

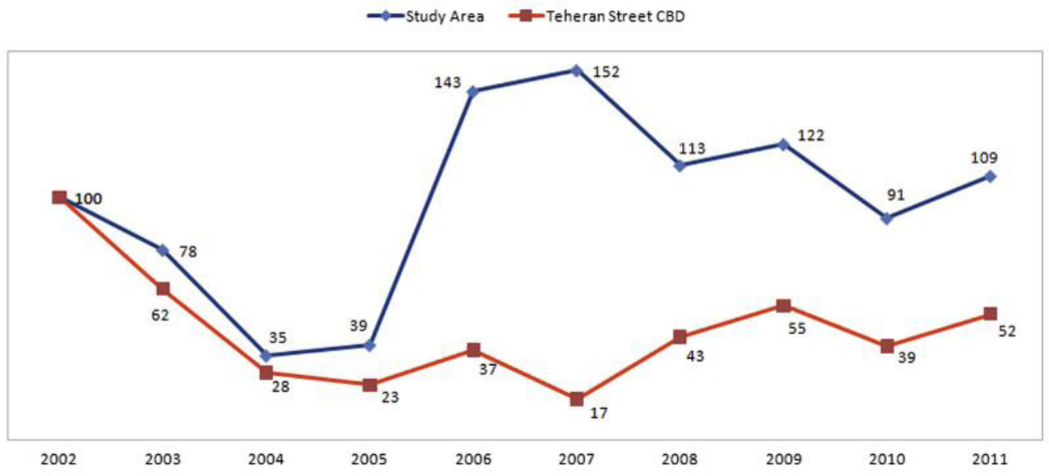

fig. 3b. *Index of lot-based land use change in study area and Teheran between 2002 and 2011 (2002 = 100).*

4.3 Comparison to the Teheran Street CBD

See fig. 3b.

Urban regeneration and gentrification:
Land use impacts of the Cheonggye Stream Restoration Project on the Seoul's central business district

5. More affluent users

Table 2
Primary use after land use changes since 2006.

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Fig. 1c.

The districts' change is dominated by commercials and offices.

#Banks invest differend from before the completion of the project.
An other reason to be concerned about dislacement of certain facilities.

#Blocks have been commercialised and changed;

A - created by offices.

B - transformed to a commercial district

C-1 - from industrials to commercials.
C-3 - redevelopments.
C-2 and C4 - maintains the industrials, but C-2 expect to be commercialised, like the adjacent B1, C1 and C4 (commercialization is happening linear a long the stream).

D - is expected to be the new culture center, in the area.

Urban regeneration and gentrification:
Land use impacts of the Cheonggye Stream Restoration Project on the Seoul's central business district

6. Conclusion

98% of land use changes at the stream, consist of higher uses; office, commercials, hotels or educatinal institutes.

Redevelopment of the area for “higher uses” qulifies the case of the Cheonggye Stream Restoration Project as a successful case of urban regeneration, while the displacement of lower industrial uses match Hackworth’s broad definition of gentrification:

“The production of space for progressively more affluent users”.

BUT, this should be more nuanced, because the definition miss out on the ideological and ethical questions involved in favoring some users.

Popularity and economic walks hand in hand. Prices increase if popularity among visittors are big. Reputation will grow, visittors wil return, and invest in the sites public facilities.

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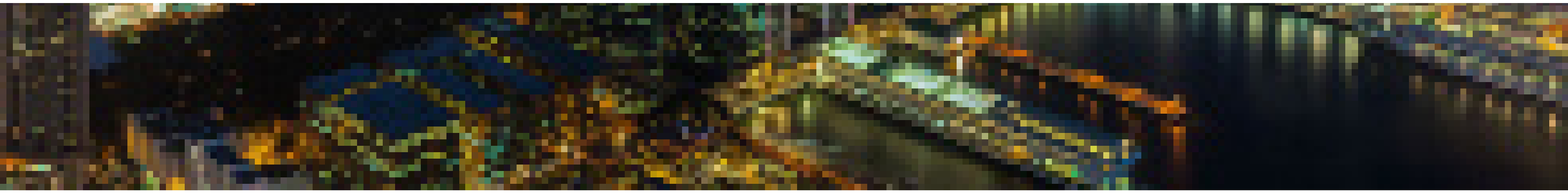
1. Introduction

Content of paper

Description of new method to simulate future land use change in urban renewal districts by combining the conversion of land use and its impact on small regional extent.

The method is created by a combination of two analyzing models, and is created to ease the urban planning processes.

The study area is a district of Kowloon in Hong Kong. The study is conducted with data from the district in the years 2000-2009.



d. Waterfront, part of YTM
https://en.wikipedia.org/wiki/Tsim_Sha_Tsui

Simulating land use change in urban renewal areas:
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2. Land use change model

Models are helpful tools for understanding the complex mechanisms of socio and physical variables that influence land use change, and for evaluating such changes.

Types:
Cellular automata(Markov Chain Model) : *can simulate spatiotemporal land use change, and is appropriate for short term predictions. It can define spatial explicitness, by rules and computation, Transition rules are the core component of CA-based models. The model can only simulate the conversion of one land use type.*

Multi-agent system models : *analyze the decision-making process of key stakeholders. Various subsets of ancillary data and discrete variables are enabled. The most current models focus on simple systems, more data from household level would improve the models' effectiveness. But, that is difficult to get.*

Integrated models : *The models are the best tools to interpret land use change processes. The Conversion of Land Use and its Effects(CLUE) model is used in regional level, and withdraw various issues.*

Simulating land use change in urban renewal areas:
A case study in Hong Kong

3. Methodology

3.1 Study area

Location: Yau Tsim Mong(YTM), Kowloon in Hongkong. A highly developed area with scarce land resources. Waterfront to the south and west.

Areal of the district: ca. 8 km2

Population : 301,800

Land use types: commercial, residential, industrial, government, institutional and community facilities, open space and vacant land. - The district is dominated by commercials.

Data sources: the Lands Department of Hong Kong - land utilization maps of the study area in 2000, 2003, 2006, 2009, and digital topographic maps.

- **Spacial data:** natural conditions, land utilization, facilities, transportation, neighborhood, and few economic data.
- **Non-spacial data**: Historical documents on social and economic aspects, population, property, prices and policies.

3. Methodology

3.1 Study area

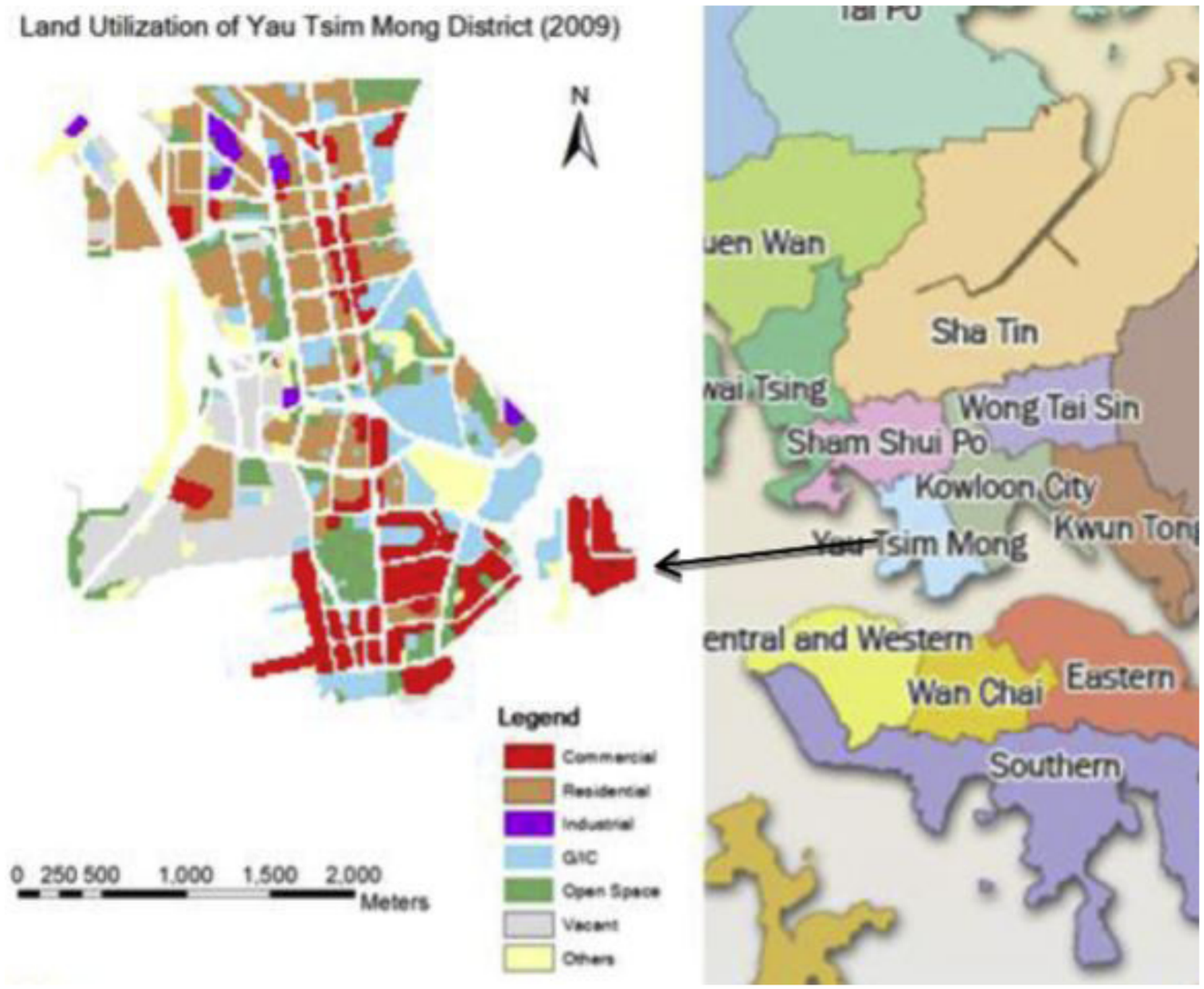

fig. 1 YTM location.

3. Methodology

Models used in the examining process.

3.2 Markov chain prediction model

In the research this model is used to calculate temporal land use demand in the year 2018. The model describe the probalistic movement and distribtions in land use change, based on an area's current status(not previous states). The use of Markov chain is appropiate for dynamics of land uses changing into each other, where the dynamic is comparatively stable during certain periods.

The transition probability matrix have a crucial role for the Markov chain model:

$$P = (P_{ij}) = \begin{bmatrix} P_{11} & P_{12} & \cdots & P_{1n} \\ P_{21} & P_{22} & \cdots & P_{2n} \\ \cdots & & & \\ P_{n1} & P_{n2} & \cdots & P_{nn} \end{bmatrix}$$

$$P_{(n)} = P_{(n-1)}P_{ij}$$

The changed data from 2000-2009 was in the study employed to calculate the conversion probabillity matrix for the prediction period 2009-2018.

n - land use type
Pij - transformation probability.
P(n) - state probability of any times
P(n-1) - previous state probability

3. Methodology

3.3 CLUE-S model

This study used for capturing land use spatially.

> spatially explicit simulation of land use change on the basis of location suitability,
> as well as dynamic modeling for competition and interactions between land uses.

Logistic regression - an essential step in the simulation process, which aims to examine the relationships between location factors and different land use types.

Land allocation probability depends on location factors, and the conversion elasticity.

3. Methodology

3.4 Other important considerations

Scenario analysis is not predicting the future, but getting a better understanding of uncertainties that can provide a good basis for decision-making.

In this examining are four scenarios simulated.

1. The baseline scenario - Only based on historical conditions.

Policy based scenarios: “*Supplying more residentials, and i”*
“ mprove the quality of environment “
two main urban objectives proposed by the government.

2. The open space scenario - Providing more open space for the urban communities
3. The residential scenario - Provides more land for residential use.
4. The scenario, that focus on both residential and open space use. Demands of open space and residential land were calculated based on the standards in scenarios 2. an 3.

3. Methodology

3.4 Model validation.

By comparing the simulated model results of a historic period with the actual/current changes of land use, you can compare the measured datasets agreement for categorial items with the kappa value.

Kappa statistics is applied to assessing the accuracy of the model with chance agreement(better than percent calculation).

K equation:

$$K = \frac{P(a) - P(e)}{1 - P(e)}$$

/K value:

0,8 < K	Strong accuracy.
0,6 < K < 0,8	High accuracy/similarity between simulated map and actually map.
0,4 < K < 0,6	Moderate accuracy.

P(a) - relative observed agreement
P(e) - hypthetical probability

Simulating land use change in urban renewal areas:
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4. Implementations and results

4.1. Temporal land use change

4.1.1 Land demands and scenarios

#Spatial simulation, temporal changes of land use need to be predicted.

Markov chain is used to project the demand of the baseline scenario from 2009 to 2018. The Markov chain only use the data from 2009 to predict YTM's state in 2018. The other three scenarios are based on the baseline scenario and future policies.

- Prediction shows, shows that the land use types will grow, by taking from vacant land.

Table 3
Areas for various land types in history (unit: ha).

Year	Commercial	Residential	Industrial	G/IC	Open space	Vacant	Others
2000	70.2617	106.4684	12.1246	87.3023	51.4901	149.3220	34.2637
2003	64.8760	128.6287	6.9258	93.9278	48.8408	130.2163	37.8174
2006	84.0548	131.8941	10.8074	90.7033	51.5202	97.4870	44.7660
2009	89.1069	133.8881	9.0288	89.8417	64.7818	78.4262	46.1593

Note: G/IC means government, institutional and community facilities.

Table 4
Land demand areas of three scenarios in 2018 (unit: ha).

2018	Commercial	Residential	Industrial	G/IC	Open space	Vacant	Others
S1	99.621	150.2993	7.3063	92.1780	66.0249	43.5243	52.2790
S2	99.621	150.2993	7.3063	92.1780	117.2600	17.9072	26.6610
S3	99.621	161.4200	7.3063	92.1780	66.0249	32.4036	52.2790
S4	99.621	161.4200	7.3063	80.2300	117.2600	17.9072	27.4883

Note: G/IC means government, institutional and community facilities. S1 means the scenario 1. S2 means the scenario 2. S3 means the scenario 3. S4 means the scenario 4.

4. Implementations and results

4.2. Regression analysis of land use

#The CLUE-S model is based on the relationship between location and different land uses.

Actual factors - selected from relevant literature - were chosen to analyze the location suitability of the land use types.

fx. location of residential land is related to factors including slope, distance to school, distance to historical sites, distance to road, distance to open space and population density.

4. Implementations and results

4.3. Model validation

The model validation, were conducted by comparing the simulated results of YTM's state in 2009, with the actual land use in 2009.

Data from the land utilization map of 2000 were used to produce the simulated land use map for 2009. This result were made with the CLUE-S model.

The accuracy is 81,53%(pixels simulated correctly to the total number of pixels). The K value is 0,7753 and is setting a substantial agreement.

fig. 3. a. land utilization map of year 2000, b. land utilization map of year 2009, C. simulated land utilization map of year 2009.

4. Implementations and results

4.4. Simulation results

The results shows the commercials have tendency to be located near the coast line. The residential is often placed in the old districts of Kowloon, and industrials have low probability to be placed anywhere.

#Simulation maps
The demands of land use in 2018 were input into the CLUE-S model separately (table 4), to predict the future land use.

The results:
1. Baseline scenario: indicates that the supply of new land is from vacant land, mainly in west Kowloon.

2. Open space scenario: The simulation results show more open space in the western Kowloon.

3. Residential scenario: There are more residential in the western part of YTM

4. Scenario 4: more residential in northwest, but open space location is similar to the openspace scenario.

4. Implementations and results

4.4. Simulation results

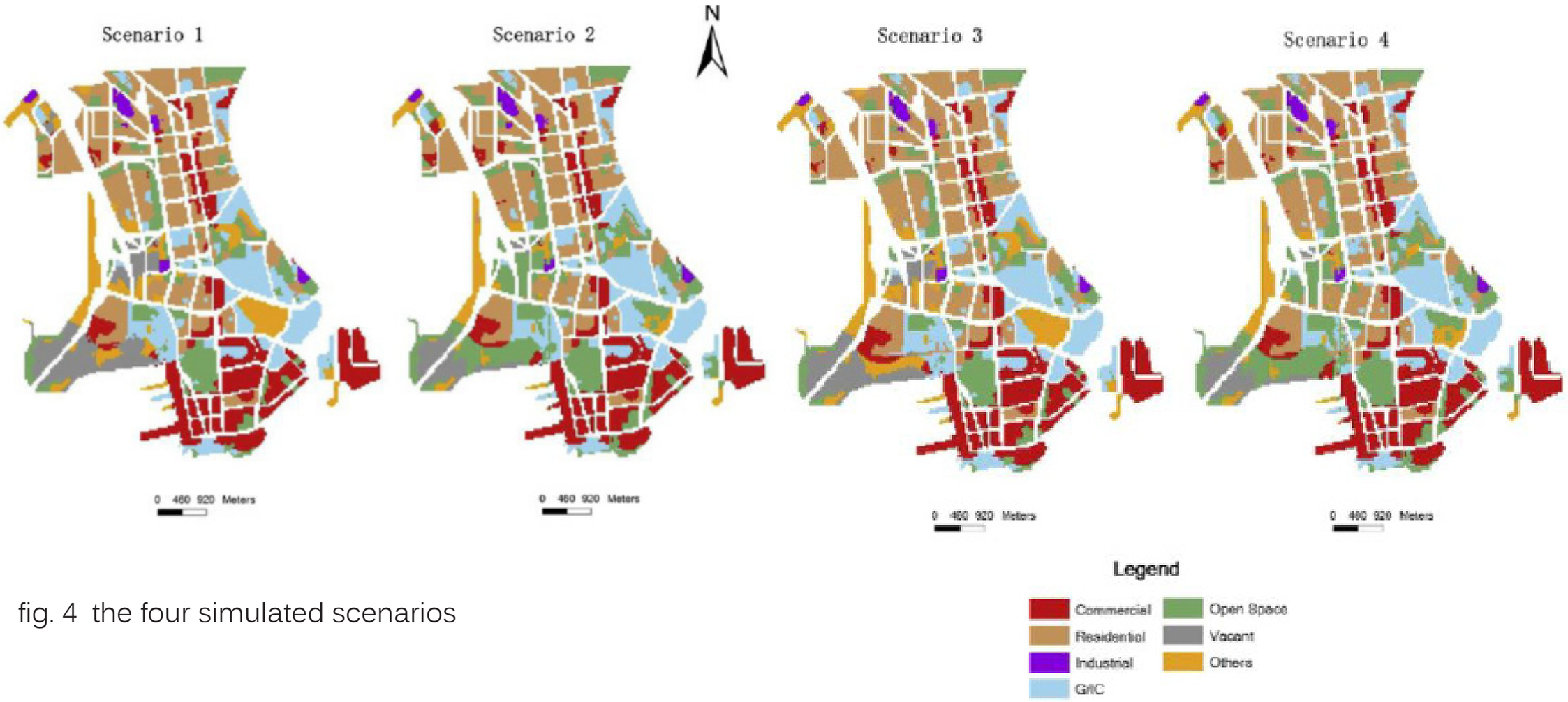

fig. 4 the four simulated scenarios

4. Implementations and results

Probability map in 2018

Industrial Use

Open Spac

Vacant Land

N

Commercial Land

Residential Land

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5. Conclusion

K value was between 0,6 and 0,8, that confirm the models effectiveness, and relying prediction in this case, but still limited.

Policy factors, that can be diffucult to take into account, are reflected in this model.
- In Hong Kong policy has a crucial role, and as example, they try to save the historical sites, parks and restrictions about spatial policies, such as redevelopment of residential sites.

The model can be used to spot land use trends, and give knowledge about how the land use will changes and interact with the other facilities, and other surroundings.

#Expansion of certain land uses in YTM, are spreading, by occupying vacant land, or industrial land.

5. Conclusion

This research proposed a combined model to explore land use mechanism through both spatial and temporal dimensions in four varying scenarious in 2018.

#The simulation results indicate that land use change is influenced by physical, locational, socio-economical and political factors (and the selected 14 factors see table 4).

Limitations
Some social and economic data cannot be obtained at a district scale.
Such as economic output of each land unit, density of land use and employment density.
Some Qulitative factors such as land ownership and land lease cannot be reflected in this kind of model.