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DEVELOPING "DRAMATIZING METHOD" AS A TOOL FOR EVALUATION OF QUALITY OF LIFE IN CITIES

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Abstract

Recently the role of urban planning has changed. In the past, the role of urban planning was meeting the demand such as land use and location for effective industrial activities, quantitative requirement of residential spaces, and so on, however recently it has improved with Quality Of Life such as amenity, preservation of nature and environment, safety, town-scape, and so on. Therefore, the process of urban planning requires the information disclosure from planners to stakeholders and the public involvement from stakeholders to planners. The planners requires the changes in citizen's daily life and the improvement of Quality of Life accompanied with implementation of urban planning, on the other hand, stakeholders requires specific change of daily life accompanied with implementation of urban planning. It's difficult for stakeholders, such as residents, to image specific change of daily life and to easily realize changes in daily life. Thus animation is better than numerical information.

This study develops "DRAMATIZING METHOD" as a new method for evaluation of urban planning alternatives, that make it possible the followings;1) Exclusion of "DRAMA" maker's individual way of thinking, 2) Considering individual viewpoint, 3) Clearly expressing tool by animations other than presentation with numerical information. And a case study declares efficiency of "DRAMATIZING METHOD" as a new method for evaluation of urban planning alternatives. The result of questionnaire declares that respondents can feel difference of daily life from "DRAMA" animation.

Keyword: DRAMATIZING METHOD, Quality Of Life (QOL), Urban Planning

1. Introduction

Recently the role of urban planning has changed. In the past, the role of urban planning was meeting the demand such as land use and location for effective industrial activities, quantitative requirement of residential spaces, and so on, however recently it has improved with Quality Of Life such as amenity, preservation of nature and environment, safety, town-scape, and so on. Therefore, the process of urban planning requires the information disclosure from planners to stakeholders and the public involvement from stakeholders to planners. The planners requires the changes in citizen's daily life and the improvement of Quality of Life accompanied with implementation of urban planning, on the other hand, stakeholders requires specific change of daily life accompanied with implementation of urban planning. It's difficult for stakeholders, such as residents, to image specific change of daily life and to easily realize changes in daily life. Thus animation is better than numerical information.

This study aims at developing a method that shows individuals' various changes of daily life, which is accompanied with implementation of urban planning, with animation instead of static images or pictures. And it asks their opinions about the changed daily life. The method is defined as "DRAMATIZING METHOD". The method is designed as a tool to support the evaluation of the urban planning as a result of encouraging information disclosure and public involvement.

2. Necessity of "DRAMATIZING METHOD"

The advantage of presentation of daily life with animation includes 1) efficient tools for evaluation of urban planning from individual viewpoint, 2) residents can simulate daily life accompanied with implementation of urban planning and image the specific changes of daily life and realize the changes in daily life easily. The individual viewpoint is very important because resident only can see town-scape in the height of eye and cannot see town-scape in bird view. In this study, satisfaction is defined;

$$S = \sum \lambda_i s_i \left(x_i \right) \tag{2.1}$$

where:

S: satisfaction of daily life that changes accompanied with implementation of urban planning

 $s_i(x_i)$: satisfaction against urban elements value

λ_i : weights by urban elements *i*

The evaluation of this satisfaction by representing S as numerical information has such a problem that it's difficult to measure weight λ_i and for residents to image satisfaction against urban elements value $s_i(x_i)$. However, presentation of daily life with animation makes it possible to directly evaluate satisfaction, and solve the problem.

The evaluation of Quality Of Life (satisfaction) needs to the following two requirements.

1) Individual evaluation because QOL is subjective index which is dependent of individual sense of value

2) Visualization of town-scape regarding individual life style to grasp individual feelings through daily life

The method, which satidfies these requirements, is such that it shows residents specific change of daily life and improvement of Quality Of Life as a result of implementation of urban planning by animations. This method, developed in this study, is named "DRAMATIZING METHOD" which provides presentation with animation of change in resients' daily life using computer graphics and Internet technology. And this makes it possible to represent resients' daily life that changes with different outcome of urban planning by animation likea "DRAMA" currently broadcast on television. In this "DRAMA" animation, land use and transportation are expressed by the design and location of buildings and the number of vehicular trips. It makes them simulate virtual everyday life and attach marks to each drama, and grasps the improvement of Quality Of Life as a result of implementation of urban planning.

3. "DRAMATIZING METHOD"

3.1. Procedure for evaluating Urban Planning by "DRAMATIZING METHOD"

Figure 3.1 shows the specific procedure for evaluating urban planning by "DRAMATIZING METHOD". The detail is described below.



Figure 3.1 Procedure for evaluating urban planning by "DRAMATIZING METHOD".

1) Setting future framework

The components expressing urban situation are forecasted based on dormitory population, which is a fundamental approach in Urban Planning, given as a scenario previously.

2) Selection of the component to be included in "Drama" animation

There are two specific notes in terms of dividing daily life to each part which comprising it. In this study each part is named "scene", and "DRAMA" animation is the combination of these scenes. The fact is to select the

scenes that are changed accompanied with implementation of urban planning such as town-scape because this study considered evaluating urban construction. The other is that it's necessary to select daily life pattern of typical personal attribute because daily life pattern is very dependent of each person's attribute preciously.

3) Setting of urban planning alternatives

The distribution of dormitory population is given as urban planning alternatives, and the distribution of daytime population is estimated by macro commerce and service location model because daytime population is expressed by the distribution of dormitory population and the state of traffic infrastructure. In addition, land use patterns in each district is estimated based on the distribution of dormitory and daytime population.

4) Specification of urban situation in each alternative

They are estimated by each model that specific design of building and underground space, various activities such as traffic, energy consumption, and environmental load.

5) Making daily life story in each urban planning alternatives

The changes of the scenes selected in phase 2) are estimated by urban situation determined in phase 4), and then daily life story is determined by combining the each scene.

6) Visualization of daily life story

The daily life story determined in phase 5) is visualized.

7) Evaluation of daily life story

The daily life stories are disclosed on the Internet. The respondents access the homepage and evaluate the each story after seeing them.

3.2. Framework of "DRAMATIZING METHOD"

Figure 3.2 shows the procedure of "DRAMATIZING METHOD". The detail is described below.



Figure 3.2 Framework of "DRAMATIZING METHOD"

1) Classification of urban elements

In this phase, urban elements are classified to "town-scape elements" and "caption elements". "town-scape elements" are elements that can be expressed by animations such as urban situation, traffic volume, "Caption elements" are elements that should be represented such as tax, environmental load, although they cannot be expressed by animations.

2) Assumption of actor's characteristics and behavioral pattern

In this phase, actor's characteristics such as age, sex, residence, office place, are assumed to make actor's daily life pattern (scenario) which makes it possible "DRAMA" animations of the sampled resident's daily life style.

3) Determining town-scape elements

In daily life "DRAMA" animations with successive scenes, it's necessary to express urban situation that changes by implementation of urban planning alternatives. Therefore, it's necessary to specify town-scape elements determining the each scene. This makes it possible to eliminate scenes that are not relevant to town-scape elements for exclusion of "DRAMA" animation maker's individual way of thinking.

4) Specification of each scene by estimating town-scape elements

The each scene is specified by estimating town-scape elements, and visualized from viewpoint of residents.

5) Sequencing all scenes

This phase makes "DRAMA" animations in each scenarios a) inserting caption elements as numerical information are necessary and b) arrranging all scenes.

4. Case study for Nagoya city

This case study uses urban planning alternatives in project of Nagoya Industrial Science Research Institute.

4.1 Introduction of the case study

4.1.1 City chosen for case study

This case study examines Nagoya city zone (it is radius of 20km within the circle centering on center of Tokyo) and target year is 2020.

4.1.2 Alternatives

This case study uses population distribution scenarios as urban planning alternatives, within three different scenarios;

1) BAU (Business As Usual)

Population distribution changes with current trend

2) Concentration in vicinity areas of Rail-interchanges

Each characteristic population distributes in the existing vicinity areas of rail-interchanges

3) Concentration in city center

Concentrated population in city center developed in the future

4.1.3 Contents of urban element used in this case study

The main contents of urban element used in this case study are;

- 1) Traffic volume: based on generation/aggregation traffic in city center
- 2) Daytime population: based on estimating employee population
- 3) Shape of building: volume model calculated by as a result of estimating the required floor area

4.2 Making "DRAMA" animations

4.2.1 Classification of urban elements

Table 4.1 shows the result of classifying urban elements to "Scene determining elements" and "Caption elements".

Town-scape elem	Caption elements	
· Population	·Passenger traffic volume	·Environmental load
· Production	·Fleight traffic volume	· Construction cost
Pop. of station influenced sphere (S.I.S)	·Park & Ride	·External cost
· Floor area of S.I.S	· Parking in city center	· Investment
·Location of residence	· Demanded floor area	• Tax
· Location of office	Building design	

Table 4.1 Classification of urban element

Occupation	Student		
Age	19		
Sex	male		
Residence	Hongo(Suburb)		
Office	University: Chikusa		
Office	Part time job: Sakae(City center)		

4.2.2 Assumption of actor's characteristics and behavioral pattern

In this case study, respondent is a university student. Table 4.2, 4.3 show the result of assumed actor's characteristics and behavioral pattern, living in Hongo (Suburb).

4.2.3 Determining town-scape elements

Table 4.4 shows relationship between scenes and town-scape elements. After eliminating scenes that are relevant to town-scape elements, three scenes are selected.

 1) 16:00 ~ 18:00 shopping (downtown: Sakae): actor walking and shopping at downtown in Sakae

Table 4.3 Daily life	pattern
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Time	Behaviour	Place		
6 7 8	Rest	Hongo(Residence)		
9	Breakfast			
10	Commuting	Hongo-Chikusa		
11 11 12 13 14	University	Chikusa		
15	Commuting	Chikusa-Sakae		
16	Shopping			
17 18 19 20 21	Part time job	Sakae		
22	Returning home	Sakae-Hongo		
23 24	Rest	Hongo(Residence)		

- 2) 22:30 ~ 22:40 return home (to station): actor walking from part time job office to station on the way to home
- 3) 22:40 return home (platform of station): view from platform of station

1) \sim 3) are scenes described in Table 4.4. Table 4.5 shows specific town-scpae elements of these three scenes.

Table 4.4 Urban elements relevant to each scene in "DRAMA" animation

			Urban elements											
Time	Scene	Urban situation to be represented	Population	Production	Population of station influenceds phere(SIS)	Floor area of SIS	Location of residence	Location of office	Passenger traffic Volume	Freight traffic volume	Park&Rid e	Parking in city center	Demande d floor area	Buildings design
9:00		Room size												
	Home [Hongo]	View through window												
9:50	W-ll-t-station	Conjgestion of sidewalk												
	walk to station	Conjgestion of road												
	[Hongo]	View												
10:00		Conjgestion of subway												
	Station [Hongo]	Conjgestion of concourse												
		Conjgestion of platform												
	Train	Conjgestion of subway												
	[Hongo ~ Chikusa]	View												
10:20	W-ll- t- University	Conjgestion of sidewalk												
	Chilcuse 1	Conjgestion of road												
	[Cilikusa]	View												
10:30	University	Room size												
	[Chikusa]	View through window												
15:30	Walk to station	Conjgestion of sidewalk												
	[Chikusa]	Conjgestion of road												
	[Cilikusa]	View												
15:40		Conjgestion of subway												
	Station[Chikusa]	Conjgestion of concourse												
		Conjgestion of platform												
	Train	Conjgestion of subway												
	[Chikusa ~ Sakae]	View												
16:00	Shopping	Conjgestion of sidewalk												
	(Citycenter)	Conjgestion of road												
	[Sakae]	View												
18:00	Parttime job	Room size												
	[Sakae]	View through window												
22:30	Return home	Conjgestion of sidewalk												
	(way to station)	Conjgestion of road												
	[Sakae]	View												
22:40	Return home	Conjgestion of subway												
	(station platform)	Conjgestion of concourse												
	[Sakae]	Conjgestion of platform												
	Train	Conjgestion of subway												
	[Sakae ~ Hongo]	View												
23:20	Walk to home	Conjgestion of sidewalk												
	[Hongo]	Conjgestion of road												
	[1101120]	View												
23:30	Home [Hongo]	Room size												
		View through window												

considered in this study necessary to consider (not considered in this study)

Town-scape	Shape of city	Traffic	Volume	Population			
Factors dependent on Town-scape element	Pedestrian (Downtown) [Sakae]		Pedestrian (Commuting) [Sakae]	Pedestrian (Downtown) [Sakae]	Pedestrian (Commuting) [Sakae]	Station [Sakae]	
Senario		Veh (veh	icles icles)	Pede (per	People in platform (persons)		
Scenario-1	Model-1	6 3		6	6	7	
Scenario-2	Model-2	6 3		6	6	9	
Scenario-3	Model-3	6	3	16	16	9	

Table 4.5 Example of town-scape elements' value

4.2.4 Combining all scenes

Based on daily life pattern specified in section 4.2.2, all scenes are emerged considering time assignment of each scene, and "caption elements" is inserted in last of "DRAMA" animations. In addition, title of "DRAMA" animation and literature information are inserted as supplementary explanations. Title of "DRAMA" animation includes name of urban planning alternative its outline with background and of three-dimensional image of population distribution. (Figure 4.1) The information, that includes purpose of action, time zone, place, is



Figure 4.1 Example of title of "DRAMA" animation

easy expression for understanding of respondents but should be paid attention not to interrupt seeing "DRAMA" animations.

4.2.5 "DRAMA" animations

Figure 4.2 shows "DRAMA" animations in each scenario. In the scene of shopping and going to station, shape of city, population and traffic volume are represented as volume model, pedestrians, moving cars respectively. There is clear difference in population represented as pedestrians. However, there are no clear differences in shape of city and traffic volume represented by volume model, moving cars respectively.

Scene Scenarios	BAU	Rail-interchanges	City center
Shopping		16:00-12	
Return home (way to station)			
Return home (station platform)			

figure-3.3 example of scene in "DRAMA"

In the scene of platform, shape of city, population and traffic volume are represented as volume model, pedestrians, moving cars respectively. After seeing all "DRAMA" animations, "caption element" that includes emission of CO2, NOX is presented as bar graph to respondents. (Figure 4.3)

Presentation of "DRAMA" animation considers that same total time is appropriate for respondents to understand difference between each scene and not to be boring. (Table 4.6)



Figure 4.3 Caption elements

Scene	Time
Title	7 sec.
Pedestrian(Downtown)[Sakae]	31 sec.
Pedestrian(Commuting)[Sakae]	30 sec.
Station [Sakae]	11 sec.
Sub total	1min. 19 sec.
$(1 \min 19 \sec) \times (3 \text{ dramas}) =$	3 min. 57 sec.
Caption element	13 sec.
Total	4 min. 10 sec.

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5. Questionnaire

5.1 Procedure of questionnaire

Questionnaire is carried out to investigate whether respondents feel change of Daily life as a result of seeing "DRAMA" animations. Procedure of questionnaire is the following;

- 1) Explanation of "DRAMA" animations, and urban planning alternatives
- 2) Presentation of "DRAMA" animation

3) Questionnaire

5.2 Contents of questionnaire

Purpose of questionnaire is evaluation of satisfaction and grasping influence of each scene on evaluation. Respondents are twelve university students who live in Nagoya to match actor assumed in "DRAMA". Contents of questionnaire are;

- 1) Marking each scenario (urban planning alternatives) with maximum mark is ten.
- 2) Checking impressive scenes affecting evaluation

5.3 Result of questionnaire

5.3.1 Satisfaction level of each scenario

Figure 5.1 shows satisfaction level of each scenario as a result of questionnaire. Mean and standard deviation are almost same value in scenarios of BAU, and concentration in vicinity areas of rail-interchanges. However, they

are extremely smaller value in city center concentration scenario than other two scenarios. It's concluded that almost respondents remark smaller value in city center concentration scenario.

5.3.2 Expressive scenes affecting evaluation

Table 5.1 shows summarized the scenes for evaluation, and it can clearly be seen that several respondents check scenes in city center concentration scenario. In each "DRAMA" animation, number of pedestrians is only represented. Comparing population in Table 4.5 and Table 5.1, several respondents feel that scenes in which large proportion of population play a role in their evaluation. Because all respondents mark lower value in city center concentration scenario than other two scenarios, it's concluded that residents can feel difference of Quality of Life in "DRAMA" animations.





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Scene	Shopping	Return home	Return home
Scenario		(to station)	(platform)
BAU	2	1	1
Rail-interchanges	1	3	3
City center	5	9	6

6. Conclusions

This study develops "DRAMATIZING METHOD" as a new method for evaluation of urban planning alternatives, that make it possible the followings;

1) Exclusion of "DRAMA" maker's individual way of thinking

It's important to select only the scenes that is relevant to town-scape elements before making "DRAMA" animation. Therefore, the scenes, which are less relevant to town-scape elements, should be eliminated since exclusion of "DRAMA" maker's individual way of thinking, and "DRAMA" maker can make "DRAMA" animation efficiently.

2) Considering individual viewpoint

It's important to makeS "DRAMA" animation form the citizen's viewpoint as the height of eye, because Quality Of Life such as amenity, preservation of nature and environment, safety, town-scape are relevant to urban situation that residents can see and pass through.

3) Clearly expressing tool by animations other than presentation with numerical information

The process of urban planning requires information disclosure and dissemination from planners to stakeholder and public involvement from stakeholder to planners. It's necessary to use clearly expressing tool by animations other than presentation with numerical information, for planners to get the information about improvement of Quality Of Life accompanied with implementation of urban planning. "DRAMATIZING METHOD" makes it possible to show residents the change of urban situation by implementation of urban planning with animation clearly.

Nagoya case study proves efficiency of "DRAMATIZING METHOD" as a new method for evaluation of urban planning alternatives. The result of questionnaire describes 1) Difference of satisfaction in each "DRAMA" animation, 2) Difference of amounts of expressive scenes, which means that respondents can feel difference of daily life from "DRAMA" animation.

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