EVALUATION OF A CENTRAL URBAN REDEVELOPMENT PROJECT BY THE SEMANTICS MEASUREMENT APPROACH[1]

Soushi Suzuki

Graduate school of engineering, Hokkai-gakuen University
South 26 West 11 Chuo-ku, Sapporo 064-0926 Japan
r299101s@eng.hokkai-s-u.ac.jp

Keywords: Semantics Measurement Approach, Evaluation Level Weighting Theory

Summary: *The Absolute Measurement Approach (AMA) is a method which reduces the burden on the examinee. However, the process of setting weights for the evaluation levels (excellent-bad, etc) still remains a burden to the examinee. This study proposes a method for theoretically setting these evaluation level weights. A Semantics Measurement Approach (SMA) based on this theory is proposed, and a large-scale redevelopment project was evaluated using this method*

1. Introduction

"Public involvement" (PI) has recently become important in urban and regional planning in Japan. AHP is a decision-making method for facilitating PI. AMA imposes less of a burden than RMA on examinee from the general public in questionnaires that list many alternatives. However, in AMA, the process of assigning weights to each qualitative evaluation level (e.g. excellent - bad) still remains a burden on the examinee. This study proposes a new evaluation method called SMA, which calculates the weighs of the evaluation level theoretically. With this new method, a large-scale redevelopment project can be evaluated from the user perspective.

2. Proposal of SMA

2.1 Evaluation level weighting theory (ELWT)

ELWT was deduced from the perspective of psychophysics. ELWT theoretically makes it possible to set weights based on the semantic stimulation level of an adjective (excellent-bad, etc) that expresses the evaluation level:

$$z = \alpha \exp(\beta y) \tag{1}$$

where, y is the stimulation of an adjective, z is the weight of the evaluation level, α is the discrimination threshold of the evaluation level weight, and β is a parameter.

2.2 SMA and advantage

To begin with, the evaluation between criteria is carried out using pair comparison. However, the evaluation level weight is set using the theoretical value calculated by ELWT. In other words, the evaluation level weight is *not* set by pair comparison by each examinee. Consequently, the burden on the examinee is greatly reduced.

3. Preliminary survey

3.1 Hierarchy figure

The Sapporo railway station in Sapporo (a city of 1,800,000 people located in Hokkaido), has been slated for renewal. This is a large-scale, central urban area redevelopment project with a gross project budget of about 100 billion yen. For this study, there are five alternatives: Sapporo station after redevelopment, plus four places within the main commercial district of Sapporo. The criteria selected were: selection of goods, entertainment, parking area function, dining, and amenities.

3.2 Execution outline

The two evaluation methods used were AMA and SMA. The evaluation level weights of AMA used the pair comparison results of each examinee. SMA used the theoretical values produced by ELWT (Table 1).

3.3 The reliability of SMA

The estimated results of each examinee were calculated using AMA and SMA, respectively. The mean values are shown in Fig.1. The total weights of AMA and SMA are nearly the same; the fact that these weights almost match verifies the high reliability of SMA.

4.Resident consciousness investigation

4.1 Investigation outline

The dates of investigation are February 21 ～ 28, 2000. The examinees were members of the general population residing in Sapporo. There was a distribution of 350, with a recovery of 168 (48.0% recovery rate). There was a total of 241 replies when the number of replies from the preliminary survey is added. The number of useful answers (C.I.<0.15) was 144 (percentage of useful replies = 59.8%).

4.2 Totaling result of criteria weight

In Fig.2, the results of totaling criteria weights are broken down according to the following attributes: young men (YM); middle-aged men (MM), elderly men (EM), young women (YW), middle-aged women (MW), and elderly woman (EW). From the results in Fig.2, the following facts were proven:

①Men and women of every age group ranked "selection of goods" as most important.

②In particular, young men emphasized "entertainment."

③Middle-aged and elderly men ranked "parking area function" as the second most important criterion.

④Young and middle-aged women assigned "dining" a higher ranking than "parking area function" and "entertainment."

4.3 Total weight result

The total weight results are shown in Fig.3. The following facts were proven:

①All six groups of people assigned Odori a high value.

②The evaluation of Sapporo station after redevelopment is equivalent to that of Odori station.

Table 1   ELWT of each criterion

criteria	evaluation level	ELWT
selection of goods	(good-bad)5stage	$z = 0.0168 \exp(0.6842\, y)$
dietary	(good-bad)5stage	$z = 0.0182 \exp(0.6654\, y)$
amenity	(good-bad)5stage	$z = 0.0191 \exp(0.6531\, y)$
enjoyment	(enjoyable-not enjoyable) 4stage	$z = 0.0236 \exp(0.8007\, y)$
parking area function	(good-bad)4stage	$z = 0.0299 \exp(0.7288\, y)$

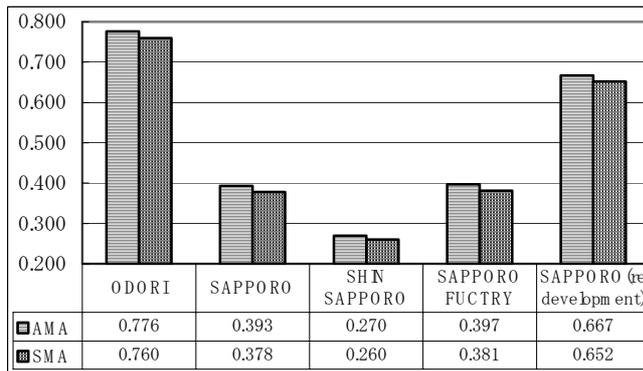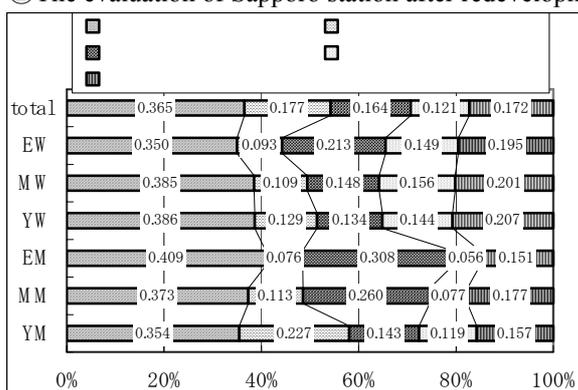|	ODORI	SAPPORO	SHIN SAPPORO	SAPPORO FUCTRY	SAPPORO (re develop ment)
AMA	0.776	0.393	0.270	0.397	0.667
SMA	0.760	0.378	0.260	0.381	0.652

Fig.1 result comparison of SMA and AMA

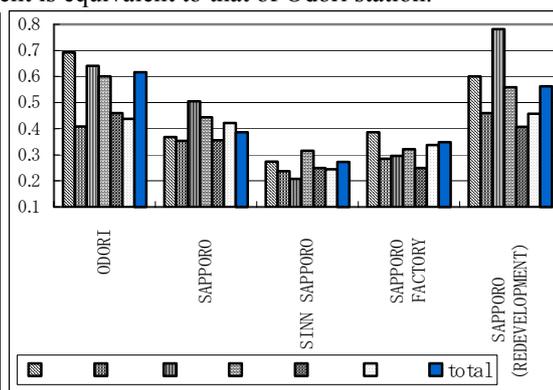**Fig.2 criteria weight result**

Fig.3 total weight result

5. Conclusion

The main results of this study are as follows.

①ELWT and SMA were proposed.

②SMA was used to evaluate the Sapporo station redevelopment project, and characteristics of each age group of men and women were analyzed.