

# Bayesian Network Analysis for the Questionnaire Investigation on the Impression at Yoshiwara Shopping Street in Fuji City

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## ABSTRACT

Shopping streets at local city in Japan became old and are generally declining. In this paper, we handle the area rebirth and/or regional revitalization of shopping street. We focus on Fuji city in Japan. Four big festivals are held at Fuji city. Many people visit these festivals including residents in that area. Therefore a questionnaire investigation to the residents and visitors is conducted during these periods in order to clarify residents and visitors' needs for the shopping street, and utilize them to the plan building of the area rebirth and/or regional revitalization of shopping street. There is a big difference between Fuji Shopping Street and Yoshiwara Shopping Street. Therefore we focus Yoshiwara Shopping Street in this paper. These are analyzed by using Bayesian Network. Sensitivity analysis is also conducted. As there are so many items, we focus on "The image of the surrounding area at this shopping street" and pick up former half and make sensitivity analysis in this paper. The analysis utilizing Bayesian Network enabled us to visualize the causal relationship among items. Furthermore, sensitivity analysis brought us estimating and predicting the prospective visitors. Sensitivity analysis is performed by back propagation method. These are utilized for constructing a much more effective and useful plan building. We have obtained fruitful results. To confirm the findings by utilizing the new consecutive visiting records would be the future works to be investigated.

**Keywords:** Fuji City, Area rebirth; Regional vitalization; festival; Bayesian Network; Back Propagation;

## INTRODUCTION

Shopping streets at local city in Japan are generally declining. It is because most of them were built in the so-called "High Growth Period (1954-1973)". Therefore they became old and area rebirth and/or regional revitalization are required everywhere.

There are many papers published concerning area rebirth or regional revitalization. Inoue (2017) has pointed out the importance of tourism promotion. Ingu et al.(2017) developed the project of shutter art to Wakkanai Chuo shopping street in Hokkaido, Japan. Ohkubo (2017) has made a questionnaire research at Jigenji shopping street in Kagoshima Prefecture, Japan and analyzed the current condition and future issues. For about tourism, many papers are presented from many aspects as follows.

Yoshida et al. designed and conducted a visitor survey on the spot, which used a questionnaire to investigate the activities of visitors to the Ueno district in Taito ward, Tokyo. Doi et al. analyzed the image of the Izu Peninsula as a tourist destination in their 2003 study "Questionnaire Survey on the Izu Peninsula." Kano conducted tourist behavior studies in Atami city in 2008, 2009, 2014 and in other years.

In this paper, we handle the area rebirth and/or regional revitalization of shopping street. We focus on Fuji city in Japan. Fuji city is located in Shizuoka Prefecture. Mt. Fuji is very famous all around the world and we can see its beautiful scenery from Fuji city, which is at the foot of Mt. Fuji. There are two big shopping street in Fuji city. One is Yoshiwara Shopping Street and another one is Fuji Shopping Street. They became old and building area rebirth and regional revitalization plan have started. Following investigation was conducted by the joint research group (Fuji Chamber of Commerce & Industry, Fujisan Area Management Company, Katsumata Maruyama Architects, Kougakuin University and Tokoha University). The main project activities are as follows.

- A. Investigation on the assets which are not in active use
- B. Questionnaire Investigation to Entrepreneur
- C. Questionnaire Investigation to the residents and visitors

After that, area rebirth and regional revitalization plan were built.

In this paper, we handle above stated C.

Four big festivals are held at Fuji city. Two big festivals are held at Yoshiwara Shopping Street and two big festivals at Fuji Shopping Street.

At Yoshiwara Shopping Street, Yoshiwara Gion Festival is carried out during June and Yoshiwara Shukuba (post-town) Festival is held during October. On the other hand, Kinoene Summer Festival is conducted during August and Kinoene Autumn Festival is performed during October at Fuji Shopping Street. Many people visit these festivals including residents in that area.

Therefore questionnaire investigation of C is conducted during these periods.

Finally, we have obtained 982 sheets (Yoshiwara district: 448, Fuji district: 534).

Basic statistical analysis and Bayesian Network analysis are executed based on that.

In this paper, a questionnaire investigation is executed in order to clarify residents and visitors' needs for the shopping street, and utilize them to the plan building of the area rebirth and/or regional revitalization of shopping street. There is a big difference between Fuji Shopping Street and Yoshiwara Shopping Street. Therefore we focus Yoshiwara Shopping Street in this paper. These are analyzed by using Bayesian Network. Sensitivity analysis is also conducted. As there are so many items, we focus on "The image of the surrounding area at this shopping street" and pick up former half and make sensitivity analysis in this paper. By that model, the causal relationship is sequentially chained by the characteristics of visitors, the purpose of visiting and the image of the surrounding area at this shopping street. The analysis utilizing Bayesian Network enabled us to visualize the causal relationship among items. Furthermore, sensitivity analysis brought us estimating and predicting the prospective visitors. Sensitivity analysis was conducted by back propagation method.

Some interesting and instructive results are obtained.

The rest of the paper is organized as follows. Outline of questionnaire investigation is stated in section 2. In section 3, Bayesian Network analysis is executed which is followed by the sensitivity analysis in section 4. Remarks is stated in section 5.

## OUTLINE AND THE BASIC STATISTICAL RESULTS OF THE QUESTIONNAIRE RESEARCH

### Outline of the Questionnaire Research

A questionnaire investigation to the residents and visitors is conducted during these periods in order to clarify residents and visitors' needs for the shopping street, and utilize them to the plan building of the area rebirth and/or regional revitalization of shopping street. The outline of questionnaire research is as follows. Questionnaire sheet is attached in Appendix 1.

1. Scope of investigation : Residents and visitors who have visited four big festivals at Fuji city in Shizuoka Prefecture, Japan
2. Period : Yoshiwara Gion Festival: June 11,12/2016  
Yoshiwara Shukuba (post-town) Festival: October 9/2016  
Kinoene Summer Festival: August 6,7/2016  
Kinoene Autumn Festival: October 15,16/2016
- (3) Method : Local site, Dispatch sheet, Self writing
- (4) Collection : Number of distribution 1400  
Number of collection 982(collection rate 70.1%)  
Valid answer 982

### Basic Statistical Results

Now, we show the main summary results by single variable.

#### *Characteristics of answers*

##### (1) Sex (Q7)

Male 55.6%, Female 44.4%

These are exhibited in Figure 1.

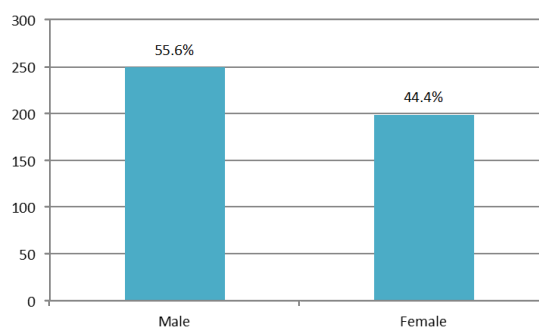


Figure 1. Sex (Q7)

##### (2) Age (Q8)

10th 10.9%, 20th 12.1%, 30th 19.0%, 40th 17.9%, 50th 13.4%, 60th 14.7%, More than 70 11.6%

These are exhibited in Figure 2.

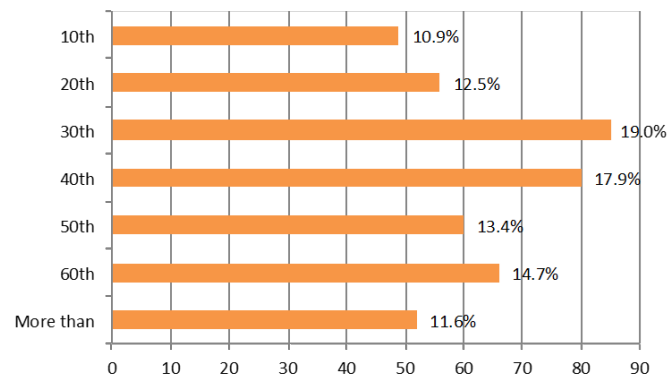


Figure 2. Age (Q8)

(3) Residence (Q9)

a. Fuji city 78.3%, b. Fujinomiya city 6.9%, c. Numazu city 4.5%, d. Mishima city 1.3%, e. Shizuoka city 2.9%, F. Else (in Shizuoka Prefecture) 2.5%, g. Outside of Shizuoka Prefecture 3.6%

These are exhibited in Figure 3.

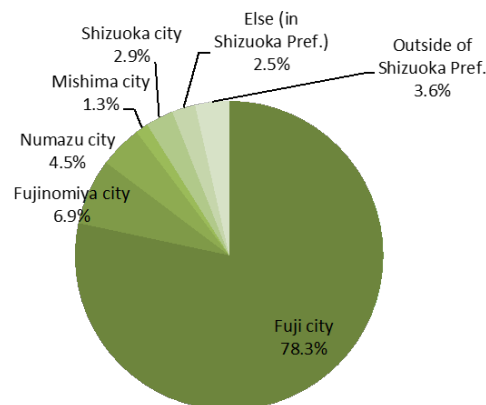


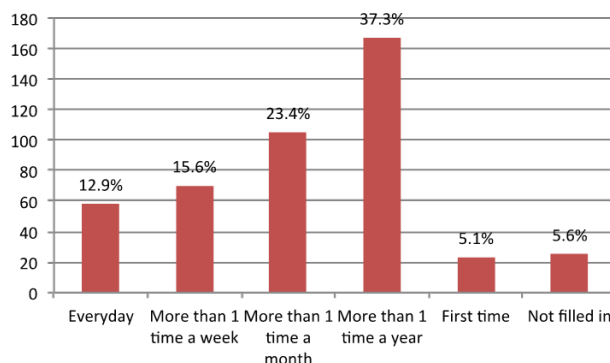
Figure 3. Residence (Q9)

**Summary results for the items used in Hypothesis Testin**

(1) How often do you come to this shopping street? (Q1)

Everyday 12.9%, More than 1 time a week 15.6%, More than 1 time a month 23.4%, More than 1 time a year 37.3%, First time 5.1%, Not filled in 5.6%

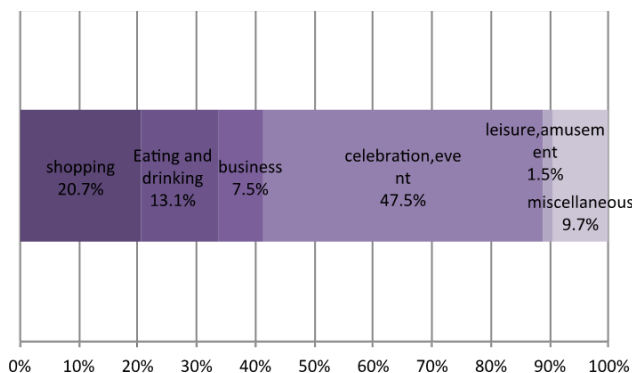
These are exhibited in Figure 4.



**Figure 4. How often do you come to this shopping street? (Q1)**

(2) What is the purpose of visiting here? (Q2)

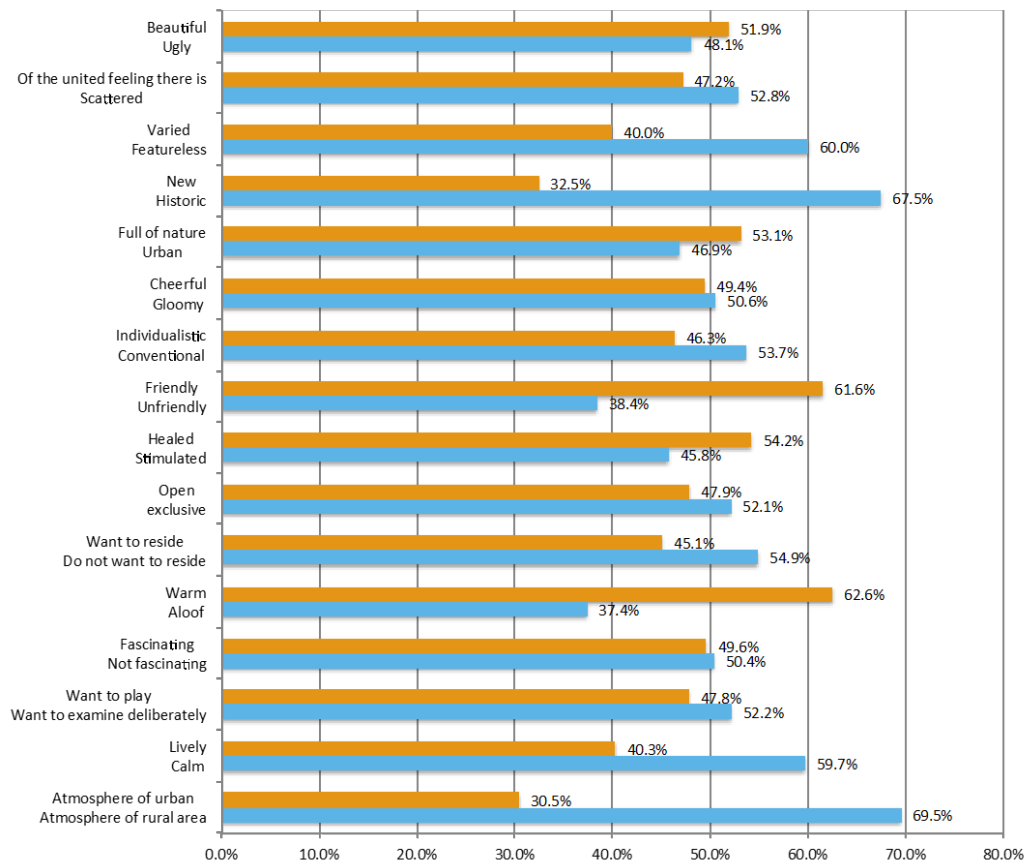
Shopping 20.7%, Eating and drinking 13.1%, Business 7.5%, Celebration, event 47.5%, Leisure, amusement 1.5%, miscellaneous 9.7%  
 These are exhibited in Figure 5.



**Figure 5. What is the purpose of visiting here? (Q2)**

(3) How do you feel about the image of the surrounding area at this shopping street? (Q3)

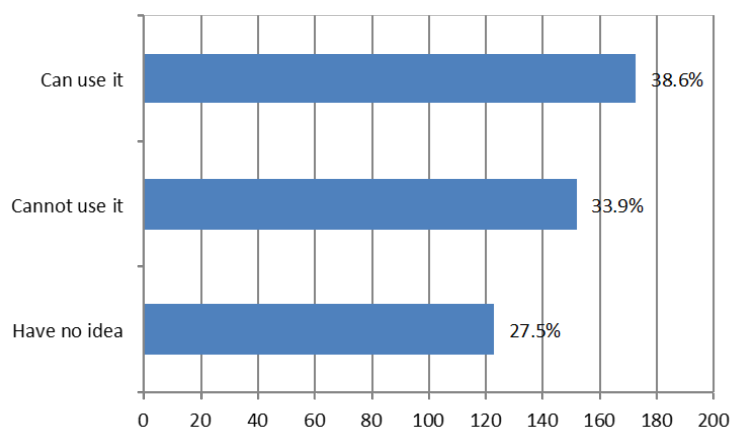
Beautiful 51.9%, Ugly 48.1%, Of the united feeling there is 47.2%, Scattered 52.8%, Varied 40.0%, Featureless 60.0%, New 32.5%, Historic 67.5%, Full of nature 53.1%, Urban 46.9%, Cheerful 49.4%, Gloomy 50.6%, Individualistic 46.3%, Conventional 53.7%, Friendly 61.6%, Unfriendly 38.4%, Healed 54.2%, Stimulated 45.8%, Open 47.9%, exclusive 52.1%, Want to reside 45.1%, Do not want to reside 54.9%, Warm 62.6%, Aloof 37.4%, Fascinating 49.6%, Not fascinating 50.4%, Want to play 47.8%, Want to examine deliberately 52.2%, Lively 40.3%, Calm 59.7%, Atmosphere of urban 30.5%, Atmosphere of rural area 69.5%  
 These are exhibited in Figure 6.



**Figure 6. How do you feel about the image of the surrounding area at this shopping street? (Q3)**

(4) There are many old building at the age of nearly 50 years. Do you think we can still use them? (Q4)

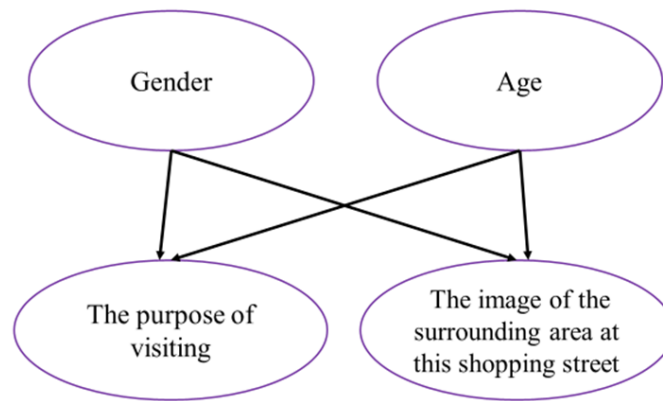
Can use it 38.6%, Cannot use it 33.9%, Have no idea 27.5%  
 These are exhibited in Figure 7.



**Figure 7. There are many old building at the age of nearly 50 years. Do you think we can still use them? (Q4)**

### BAYESIAN NETWORK ANALYSIS

In constructing Bayesian Network, it is required to check the causal relationship among groups of items.  
 Based on this, a model is built as is shown in Figure 8.



**Figure 8. A Built Model**

We used BAYONET software (<http://www.msi.co.jp/BAYONET/>). When plural nodes exist in the same group, it occurs that causal relationship is hard to set a priori. In that case, BAYONET system set the sequence automatically utilizing AIC standard. Node and parameter of Figure 8 are exhibited in Table 1.

**Table 1. Node and Parameter**

Node	Parameter									
	1	2	3	4	5	6	7	8	9	10
Gender	Male	Female								
Age	10th	20th	30th	40th	50th	60th	More than 70			
The purpose of visiting	Shopping	Eating and drinking	Business	Celebration event	Leisure, amusement	miscellaneous				
The image of the surrounding area at this shopping street	Beautiful	Ugly	Of the united feeling there is	Scattered	Varied	Featureless	New	Historic	Full of nature	Urban

Node	Parameter									
	11	12	13	14	15	16	17	18	19	20
The image of the surrounding area at this shopping street	Cheerful	Gloomy	Individualistic	Conventional	Friendly	Unfriendly	Healed	Stimulated	Open	Exclusive

Node	Parameter									
	21	22	23	24	25	26	27	28	29	30
The image of the surrounding area at this shopping street	Want to reside	Do not want to reside	Warm	Aloof	Fascinating	Not fascinating	Want to play	Want to examine deliberately	Lively	Calm

Node	Parameter	
	31	32
The image of the surrounding area at this shopping street	Atmosphere of urban	Atmosphere of rural area

In the next section, sensitivity analysis is achieved by back propagation method. Back propagation method is conducted in the following method (Figure 9).

$$Pr(X = x) = \sum_u P(x|U = u) \cdot P(U = u)$$

$$P(x) = \sum_{Y_j} Y_{jX}(x)$$

$$P_{XY_j}(x) = \sum_{k,j} Y_{kX}(x)$$

$$P_{XU_i}(u) = \sum_x P(x|U) \cdot P(U = u)$$

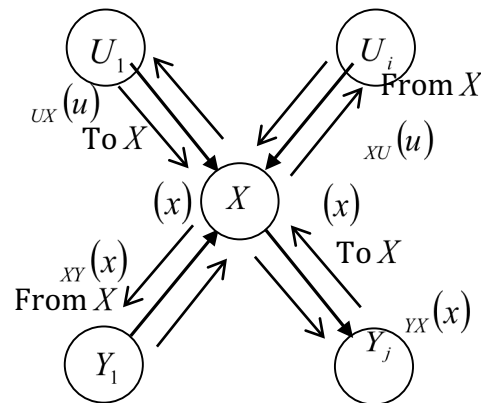


Figure 9. Back propagation method (Takeyasu et al., 2010)

### SENSITIVITY ANALYSIS

Now, posterior probability is calculated by setting evidence as, for example, 1.0. Comparing Prior probability and Posterior probability, we can seek the change and confirm the preference or image of the surrounding area at this shopping street. We set evidence to all parameters. Therefore, the analysis volume becomes too large. In this paper, we focus on “The image of the surrounding area at this shopping street” and pick up latter half and make sensitivity analysis. We prepare another paper for the rest of them.

As stated above, we set evidence for each parameter, and the calculated posterior probability is exhibited in Appendix 2. The value of “Posterior probability – Prior probability” (we call this “Difference of probability” hereafter) is exhibited in Appendix 3. The sensitivity analysis is executed by mainly using this table.

Here, we classify each item by the strength of the difference of probability.

- Strong (++, --): Select major parameter of which absolute value of difference of probability is more than 0.05
- Medium (+, -): Select major parameter of which absolute value of difference of probability is more than 0.01



- Weak: Else

In selecting items, negative value does not necessarily have distinct meaning, therefore we mainly pick up positive value in the case meaning is not clear.

Now we examine each for Strong and Medium case.

### Sensitively Analysis for “The image of the surrounding area at this shopping street

#### (1) Setting evidence to “Healed”

After setting evidence to “Healed”, the result is exhibited in Table 2.

**Table 2. Setting evidence to “Healed” case**

Shopping	—
Eating and drinking	—
Of the united feeling there is	+
Cheerful	+
Individualistic	+
Fascinating	+
Want to play	+
Lively	+
Atmosphere of urban	+
Male	—
Female	+
Age: 10th	++
Age: 20th	+
Age: 30th	+
Age: 40th	+
Age: 50th	--
Age: 60th	—
Age: More than 70	--

We can observe that “Those who have an image of the surrounding area at this shopping street as “Healed” had come under the image of the surrounding area at this shopping street as “Of the united feeling there is”, “Cheerful”, “Individualistic”, “Fascinating”, “Want to play”, “Lively” or “Atmosphere of urban” of an age of “10th”, “20th”, “30th” or “40th” in which the gender is “Female”. (Strong part is indicated by bold font.)

#### (2) Setting evidence to “Stimulated”

After setting evidence to “Stimulated”, the result is exhibited in Table 3.

**Table 3. Setting evidence to “Stimulated” case**

Fascinating	—
Want to play	—
Lively	—
Age: 10th	--
Age: 20th	--
Age: 50th	+
Age: 60th	+
Age: More than 70	+

We can observe that “Those who have an image of the surrounding area at this shopping street as “Stimulated” had come by an age of “50th”, “60th” or “More than 70”.

**(3) Setting evidence to “Open”**

After setting evidence to “Open”, the result is exhibited in Table 4.

**Table 4. Setting evidence to “Stimulated” case**

Male	+
Female	-
Age: 20th	+
Age: 40th	+
Age: 50th	-
Age: 60th	+
Age: More than 70	-

We can observe that “Those who have an image of the surrounding area at this shopping street as “Open” had come by an age of “20th”, “40th” or “60th” in which the gender is “Male”.

**(4) Setting evidence to “Exclusive”**

After setting evidence to “Exclusive”, the result is exhibited in Table 5.

**Table 5. Setting evidence to “Exclusive” case**

Business	+
Atmosphere of urban	-
Male	-
Female	+
Age: 10th	--
Age: 20th	++
Age: 30th	++
Age: 40th	-
Age: 50th	-
Age: 60th	-
Age: More than 70	-

We can observe that “Those who have an image of the surrounding area at this shopping street as “Exclusive” had come with the purpose of visiting for “Business” of an age of “20th” or “30th” in which the gender is “Female”.

**(5) Setting evidence to “Want to reside”**

After setting evidence to “Want to reside”, the result is exhibited in Table 6.

**Table 6. Setting evidence to “Want to reside” case**

Male	+
Female	-
Age: 10th	-
Age: 20th	+
Age: 40th	+
Age: 50th	-
Age: 60th	-
Age: More than 70	++

We can observe that “Those who have an image of the surrounding area at this shopping street as “Want to reside” had come by an age of “20th”, “40th” or “More than 70” in which the gender is “Male”.

## (6) Setting Evidence to “Do not want to reside”

After setting evidence to “Do not want to reside”, the result is exhibited in Table 7.

**Table 7. Setting evidence to “Do not want to reside” case**

Business	—
Lively	+
Male	+
Female	—
Age: 10th	++
Age: 20th	—
Age: 30th	+
Age: 40th	—
Age: 50th	—
Age: 60th	++
Age: More than 70	--

We can observe that “Those who have an image of the surrounding area at this shopping street as “Do not want to reside” had come under the image of the surrounding area at this shopping street as “Lively” of an age of “10th”, “30th” or “60th” in which the gender is “Male”.

## (7) Setting Evidence to “Warm”

After setting evidence to “Warm”, the result is exhibited in Table 8.

**Table 8. Setting evidence to “Warm” case**

Eating and drinking	—
Leisure, amusement	—
Male	—
Female	+
Age: 10th	+
Age: 40th	++
Age: 50th	--
Age: 60th	—
Age: More than 70	—

We can observe that “Those who have an image of the surrounding area at this shopping street as “Warm” had come by an age of “10th” or “40th” in which the gender is “Female”.

## (8) Setting evidence to “Aloof”

After setting evidence to “Aloof”, the result is exhibited in Table 9.

**Table 9. Setting evidence to “Aloof” case**

Age: 30th	—
Age: 50th	+
Age: 60th	++
Age: More than 70	--

We can observe that “Those who have an image of the surrounding area at this shopping street as “Aloof” had come by an age of “50th” or “60th”.

## (9) Setting evidence to “Fascinating”

After setting evidence to “Fascinating”, the result is exhibited in Table 10.

**Table 10. Setting evidence to “Fascinating” case**

Shopping	—
Eating and drinking	—
Beautiful	+
Ugly	—
Of the united feeling there is	+
Scattered	—
Varied	+
Featureless	—
Urban	—
Cheerful	+
Gloomy	—
Individualistic	+
Friendly	+
Healed	+
Stimulated	—
Want to play	+
Lively	+
Male	—
Female	+
Age: 10 <sup>th</sup>	++
Age: 20 <sup>th</sup>	++
Age: 40 <sup>th</sup>	—
Age: 50 <sup>th</sup>	--
Age: 60 <sup>th</sup>	--
Age: More than 70	—

We can observe that “Those who have an image of the surrounding area at this shopping street as “Fascinating” had come under the image of the surrounding area at this shopping street as “Beautiful”, “Of the united feeling there is”, “Varied”, “Cheerful”, “Individualistic”, “Friendly”, “Healed”, “Want to play” or “Lively” of an age of “10<sup>th</sup>” or “20<sup>th</sup>” in which the gender is “Female”.

(10) Setting evidence to “Not fascinating”

After setting evidence to “Not fascinating”, the result is exhibited in Table 11.

**Table 11. Setting evidence to “Not fascinating” case**

Of the united feeling there is	—
Featureless	+
Urban	+
Cheerful	—
Gloomy	+
Individualistic	—
Want to play	—
Want to examine deliberately	+
Lively	—
Atmosphere of urban	—
Female	+
Age: 10 <sup>th</sup>	— —
Age: 20 <sup>th</sup>	—
Age: 30 <sup>th</sup>	++
Age: 40 <sup>th</sup>	—
Age: 50 <sup>th</sup>	—
Age: 60 <sup>th</sup>	++
Age: More than 70	+

We can observe that “Those who have an image of the surrounding area at this shopping street as “Not fascinating” had come under the image of the surrounding area at this shopping street as “Featureless”, “Urban”, “Gloomy” or “Want to examine deliberately” of an age of an age of “30<sup>th</sup>”, “60<sup>th</sup>” or “More than 70” in which the gender is “Female”.

(11) Setting evidence to “Want to play”

After setting evidence to “Want to play”, the result is exhibited in Table 12.

**Table 12. Setting evidence to “Want to play” case**

Shopping	—
Eating and drinking	—
Business	—
Ugly	—
Of the united feeling there is	+
Scattered	—
Urban	—
Cheerful	+
Gloomy	—
Individualistic	+
Friendly	+
Healed	+
Stimulated	—
Fascinating	+
Not fascinating	—
Lively	+
Calm	—
Atmosphere of urban	+
Atmosphere of rural area	—
Male	+
Female	—
Age: 10 <sup>th</sup>	++
Age: 20 <sup>th</sup>	++
Age: 30 <sup>th</sup>	—
Age: 40 <sup>th</sup>	+
Age: 50 <sup>th</sup>	--
Age: 60 <sup>th</sup>	--
Age: More than 70	--

We can observe that “Those who have an image of the surrounding area at this shopping street as “Want to play” had come under the image of the surrounding area at this shopping street as “Of the united feeling there is”, “Cheerful”, “Individualistic”, “Friendly”, “Healed”, “Fascinating”, “Lively” or “Atmosphere of urban” of an age of “10<sup>th</sup>”, “20<sup>th</sup>” or “40<sup>th</sup>” in which the gender is “Male”.

(12) Setting evidence to “Want to examine deliberately”

After setting evidence to “Want to examine deliberately”, the result is exhibited in Table 13.

**Table 13. Setting evidence to “Want to examine deliberately” case**

Shopping	+
Eating and drinking	-
Ugly	+
Of the united feeling there is	-
Gloomy	+
Individualistic	-
Fascinating	-
Not fascinating	+
Lively	-
Atmosphere of urban	-
Male	-
Female	+
Age: 10 <sup>th</sup>	--
Age: 20 <sup>th</sup>	-
Age: 30 <sup>th</sup>	-
Age: 40 <sup>th</sup>	+
Age: 50 <sup>th</sup>	--
Age: 60 <sup>th</sup>	++
Age: More than 70	++

We can observe that “Those who have an image of the surrounding area at this shopping street as “Want to examine deliberately” had come with the purpose of visiting for “Shopping” under the image of the surrounding area at this shopping street as “Ugly”, “Gloomy” or “Not fascinating” of an age of “40<sup>th</sup>”, “60<sup>th</sup>” or “More than 70” in which the gender is “Female”.

(13) Setting evidence to “Lively”

After setting evidence to “Lively”, the result is exhibited in Table 14.

**Table 14. Setting evidence to “Lively” case**

Shopping	—
Business	—
Beautiful	+
Ugly	—
Of the united feeling there is	+
Scattered	—
Varied	+
Cheerful	+
Gloomy	—
Individualistic	+
Friendly	+
Healed	+
Stimulated	—
Fascinating	+
Not fascinating	—
Want to play	+
Want to examine deliberately	—
Atmosphere of urban	+
Atmosphere of rural area	—
Male	+
Female	—
Age: 10th	++
Age: 20th	++
Age: 30th	—
Age: 40th	--
Age: 50th	--
Age: 60th	--
Age: More than 70	—

We can observe that “Those who have an image of the surrounding area at this shopping street as “Lively” had come under the image of the surrounding area at this shopping street as “Beautiful”, “Of the united feeling there is”, “Varied”, “Cheerful”, “Individualistic”, “Friendly”, “Healed”, “Fascinating”, “Want to play”, or “Atmosphere of urban” of an age of “10th” or “20th” in which the gender is “Male”.

**(14) Setting evidence to “Calm”**

After setting evidence to “Calm”, the result is exhibited in Table 15.



**Table 15. Setting evidence to “Calm” case**

Shopping	+
Leisure, amusement	—
Of the united feeling there is	—
Cheerful	—
Individualistic	—
Fascinating	—
Not fascinating	+
Want to play	—
Want to examine deliberately	+
Atmosphere of urban	—
Male	—
Female	+
Age: 10th	— —
Age: 20th	— —
Age: 30th	++
Age: 50th	+
Age: 60th	+
Age: More than 70	++

We can observe that “Those who have an image of the surrounding area at this shopping street as “Calm” had come with the purpose of visiting for “Shopping” under the image of the surrounding area at this shopping street as “Not fascinating”, or “Want to examine deliberately” of an age of “30th”, “50th”, “60th” or “More than 70” in which the gender is “Female”.

(15) Setting evidence to “Atmosphere of urban”

After setting evidence to “Atmosphere of urban”, the result is exhibited in Table 16.

**Table 16. Setting evidence to “Atmosphere of urban” case**

Business	—
Cheerful	+
Want to play	+
Lively	+
Male	+
Female	—
Age: 10th	++
Age: 20th	—
Age: 40th	—
Age: 50th	—
Age: 60th	—
Age: More than 70	++

We can observe that “Those who have an image of the surrounding area at this shopping street as “Atmosphere of urban” had come under the image of the surrounding area at this shopping street as “Cheerful”, “Want to play” or “Lively” of an age of “10th” or “More than 70” in which the gender is “Male”.

(16) Setting evidence to “Atmosphere of rural area”

After setting evidence to “Atmosphere of rural area”, the result is exhibited in Table 17.

**Table 17. Setting evidence to “Atmosphere of rural area” case**

Business	+
Of the united feeling there is	—
Cheerful	—
Individualistic	—
Friendly	—
Fascinating	—
Not fascinating	+
Want to play	—
Want to examine deliberately	+
Lively	—
Male	—
Female	+
Age: 10th	—
Age: 40th	—
Age: 50th	++
Age: 60th	++
Age: More than 70	+

We can observe that “Those who have an image of the surrounding area at this shopping street as “Atmosphere of rural area” had come with the purpose of visiting for “Business” under the image of the surrounding area at this shopping street as “Not fascinating” or “Want to examine deliberately” of an age of “50th”, “60th” or “More than 70” in which the gender is “Female”.

#### REMARKS

The Results for Bayesian Network Analysis are as follows.

In the Bayesian Network Analysis, model was built under the examination of the causal relationship among items. Sensitively Analysis was conducted after that. The main result of sensitively analysis is as follows.

We can observe that “Those who have an image of the surrounding area at this shopping street as “Healed” had come under the image of the surrounding area at this shopping street as “Of the united feeling there is”, “Cheerful”, “Individualistic”, “Fascinating”, “Want to play”, “Lively” or “Atmosphere of urban” of an age of “10th”, “20th”, “30th” or “40th” in which the gender is “Female”.

We can observe that “Those who have an image of the surrounding area at this shopping street as “Fascinating” had come under the image of the surrounding area at this shopping street as “Beautiful”, “Of the united feeling there is”, “Varied”, “Cheerful”, “Individualistic”, “Friendly”, “Healed”, “Want to play” or “Lively” of an age of “10th” or “20th” in which the gender is “Female”.

We can observe that “Those who have an image of the surrounding area at this shopping street as “Want to play” had come under the image of the surrounding area at this shopping street as “Of the united feeling there is”, “Cheerful”, “Individualistic”, “Friendly”, “Healed”, “Fascinating”, “Lively” or “Atmosphere of urban” of an age of “10th”, “20th” or “40th” in which the gender is “Male”.

We can observe that “Those who have an image of the surrounding area at this shopping street as “Want to examine deliberately” had come with the purpose of visiting for “Shopping” under the image of the surrounding area at this shopping street as “Ugly”, “Gloomy” or “Not fascinating” of an age of “40th”, “60th” or “More than 70” in which the gender is “Female”.



3. How do you feel about the image of the surrounding area at this shopping street?

Select the position

Beautiful	.	.	.	.	.	Ugly
Of the united feeling there is	.	.	.	.	.	Scattered
Varied	.	.	.	.	.	Featureless
New	.	.	.	.	.	Historic
Full of nature	.	.	.	.	.	Urban
Cheerful	.	.	.	.	.	Gloomy
Individualistic	.	.	.	.	.	Conventional
Friendly	.	.	.	.	.	Unfriendly
Healed	.	.	.	.	.	Stimulated
Open	.	.	.	.	.	exclusive
Want to reside	.	.	.	.	.	Do not want to reside
Warm	.	.	.	.	.	Aloof
Fascinating	.	.	.	.	.	Not fascinating
Want to play	.	.	.	.	.	Want to examine deliberately
Lively	.	.	.	.	.	Calm
Atmosphere of urban	.	.	.	.	.	Atmosphere of rural area

4. There are many old building at the age of nearly 50 years. Do you think we can still use them?

- a. Can use it
- b. Cannot use it
- c. Have no idea

5. Is there any functions or facilities that will be useful?

6. Comments

7. Sex

- a. Male
- b. Female

8. Age

a.10th b.20th c.30th d.40th e.50th f.6th g. More than70

9. Residence

a. Fuji City b. Fujinomiya City c. Numazu City d. Mishima City e. Shizuoka City f. Miscellaneous  
in Shizuoka Prefecture g. Outside of Shizuoka Prefecture [ ]





### APPENDIX 3

### Difference of probability

name: Yoshiwara	SECT	Prior	The impact of existing	SECT	Prior	The impact of the surrounding area at this shopping street
The purpose of visiting	Shopping	0.252	1	-0.012	0.008	0.005
	Shopping and dining	0.172	0.009	1	-0.009	0.001
	Business	0.114	0.003	-0.004	1	0.003
	Business and dining	0.546	0.013	-0.011	-0.017	1
	Business and shopping	0.046	0.002	0.000	0.001	0.001
	Business and shopping and dining	0.134	0.011	-0.011	0.001	0.005
	Business and shopping and dining and shopping	0.246	0.007	-0.002	0.009	0.003
	Business and shopping and dining and shopping and dining	0.293	0.007	-0.011	-0.002	0.007
	Business and shopping and dining and shopping and dining and shopping	0.367	0.013	0.010	0.003	0.006
	Business and shopping and dining and shopping and dining and shopping and dining and shopping	0.194	0.006	-0.003	0.004	0.000
The range of the surrounding area at this shopping street	Business	0.442	0.001	0.012	-0.010	0.001
	Business and dining	0.153	0.003	-0.009	0.012	0.006
	Business and shopping	0.297	0.014	0.014	-0.007	0.004
	Business and shopping and dining	0.329	0.001	-0.010	0.009	0.000
	Business and shopping and dining and shopping	0.241	0.001	0.008	-0.006	-0.001
	Business and shopping and dining and shopping and dining	0.344	0.011	-0.008	-0.012	0.004
	Business and shopping and dining and shopping and dining and shopping	0.365	0.004	0.004	0.014	0.004
	Business and shopping and dining and shopping and dining and shopping and dining	0.276	0.010	-0.004	-0.003	0.001
	Business and shopping and dining and shopping and dining and shopping and dining and shopping	0.349	0.006	-0.003	0.007	-0.001
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.401	0.007	-0.009	0.018	0.006
The range of the surrounding area at this shopping street	Business and shopping	0.208	0.000	0.004	0.015	0.003
	Business and shopping and dining	0.311	0.010	-0.012	-0.007	0.006
	Business and shopping and dining and shopping	0.225	0.006	0.007	-0.001	-0.001
	Business and shopping and dining and shopping and dining	0.280	0.005	0.004	0.000	0.000
	Business and shopping and dining and shopping and dining and shopping	0.349	0.004	-0.007	0.015	0.001
	Business and shopping and dining and shopping and dining and shopping and dining	0.290	0.001	0.000	0.007	0.001
	Business and shopping and dining and shopping and dining and shopping and dining and shopping	0.496	0.003	-0.015	0.001	-0.010
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.177	0.003	0.001	0.001	0.002
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.317	0.012	-0.022	-0.002	0.006
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.331	0.002	0.005	0.004	0.000
The range of the surrounding area at this shopping street	Business and shopping and dining	0.250	0.013	-0.012	-0.012	0.005
	Business and shopping and dining and shopping	0.247	0.017	-0.008	0.002	0.001
	Business and shopping and dining and shopping and dining	0.487	0.012	-0.008	0.002	0.003
	Business and shopping and dining and shopping and dining and shopping	0.129	0.005	-0.007	-0.013	0.003
	Business and shopping and dining and shopping and dining and shopping and dining	0.556	0.008	0.005	-0.004	0.019
	Business and shopping and dining and shopping and dining and shopping and dining and shopping	0.444	0.008	-0.005	0.004	0.009
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.110	0.011	-0.009	-0.007	0.018
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.125	0.027	-0.026	0.005	0.014
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.189	0.002	0.035	-0.044	0.000
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.178	0.025	0.014	0.011	-0.008
The range of the surrounding area at this shopping street	Business and shopping and dining and shopping	0.144	0.014	0.017	0.016	0.017
	Business and shopping and dining and shopping and dining and shopping	0.147	0.012	0.020	-0.016	0.014
	Business and shopping and dining and shopping and dining and shopping and dining	0.116	0.030	-0.030	0.014	0.005
	Business and shopping and dining and shopping and dining and shopping and dining and shopping	0.006	0.006	0.006	0.006	0.006
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining	-0.004	-0.006	-0.006	-0.006	-0.006
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.000	0.000	0.000	0.000	0.000
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.000	0.000	0.000	0.000	0.000
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.000	0.000	0.000	0.000	0.000
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining	0.000	0.000	0.000	0.000	0.000
	Business and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping and dining and shopping	0.000	0.000	0.000	0.000	0.000



