



## Analysis of Questionnaire for Consumers in Building Greengrocery Traceability System

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# Analysis of Questionnaire for Consumers in Building Greengrocery Traceability System

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## 1. INTRODUCTION

In recent years, following incidents caused the distrust to “the food” of the consumers such as harmful microorganism (0157), the remaining of the agricultural production material (the agricultural chemicals, antibiotic etc.), the problem of the use of the occurrence of safety un-examined GMO (Genetically Modified Organisms) food mixture and the unregistered agricultural chemicals and the false title display case of the crop.

Therefore, it is becoming a national trend to record information of the production of the kind and the quantity, the scattering period of the agricultural chemicals and the chemical fertilizer and to try to make these information public.

The greengrocery traceability system is being developed in order to establish reliability for the food. As for the system development, a easy-to-use system must be sought. Also, it must be possible to utilize for the quick investigation when the food accident occurs. Moreover, the information must be easily obtained.

Under these back ground, we implemented a questionnaire survey to grasp the consumers awareness in greengrocery purchase and the information they want and the means of offering these information.

In section 2, aim of taking questionnaire to consumers is stated. Outline of traceability system is exhibited in section 3. Outline of questionnaire research is stated in section 4. In section 5, an analysis is executed which is followed by the summary of section 6.

## 2. PURPOSE OF THE QUESTIONNAIRE SURVEY

The purpose of this survey is to grasp how the consumers think about the safety and the relief of the greengrocery they eats. We grasp various consciousness about the safety

and the relief of the greengrocery by the questionnaire survey and it clarifies a general opinion concerning the greengrocery traceability system.

Also, we gather the consumer's consciousness for the production record, expectations, request etc..

### 3. OUTLINE OF TRACEABILITY SYSTEM

We are going to build the following system (Chart3.1 Outline of Traceability). The target of the system is "Booking and management of the production history". Then distribution history may be utilized in distributors existing system.

To reduce the work load to input the production data, we take mobile phone with camera as input terminal. And the terminal can handle QR code (two dimensional bar code).

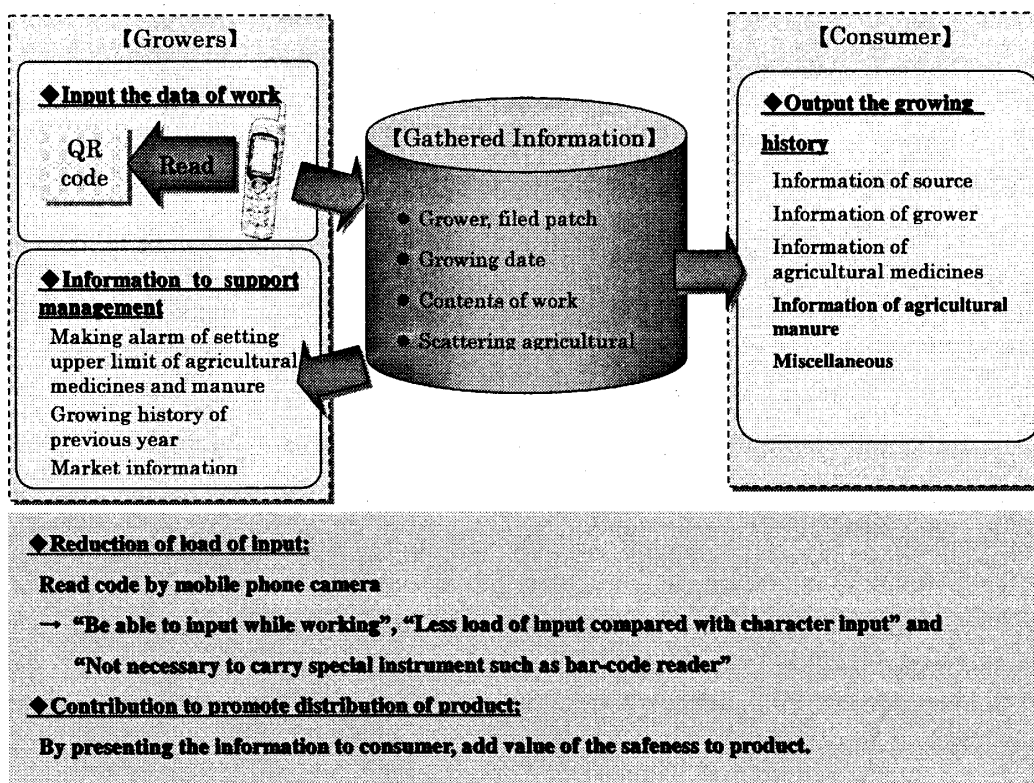


Chart3.1 Outline of Traceability System

### 4. OUTLINE OF QUESTIONNAIRE RESEARCH

Outline of questionnaire research is as follows.

## (1) First step research

Scope of investigation	To registered members of Net Pal (Monitors of Osaka Prefecture Administration)
Period	October 2004
Method	Internet and self writing
Collection	Number of distribution 500, Number of collection 391 (Collection Rate 78.2%)

## (2) Second step research

Scope of investigation	To attendants of the Food Life Fair held at Living Information Plaza
Period	November 2004
Method	Self writing at the Fair site
Collection	Number of distribution 208, Number of collection 126 (Collection Rate 60.6%)

## 5. ANALYSIS OF QUESTIONNAIRE RESULTS

Questionnaire results are analyzed by five methods. First, summary by single variable is explained in 5.1. Second, analysis by Key Graph is executed in 5.2. Third, analysis by Quantification Method II and IV is executed in 5.3. Fourth, analysis by Factor analysis is executed in 5.4. Fifth, analysis by Correspondence is executed in 5.5. In section 5.6, comparison of the analysis is executed.

## 5.1. Summary by single variable

Summary by single variable is as follows.

## (1) Outline of consumers

## ① The important points in judging the safety of greengrocery (Question 1)

Answers are given by the 5 step evaluation in judging the safety of the greengrocery.

The percentage of the important points with the summary of the item, "extremely esteeming" and "esteem to some extent" about the safety in evaluating the greengrocery are as follows.

- Flavor and bloom : 83%
- Reliability of the store : 81%
- Non-existence of genetic modification : 73%
- Usage of the agricultural chemicals and manure : 72%
- Production Location : 68%
- Cropping date : 68%
- Safety authentication mark : 64%
- Face to face or mass communication information : 58%
- Brand : 40%
- Address, name and photograph of the grower : 31%

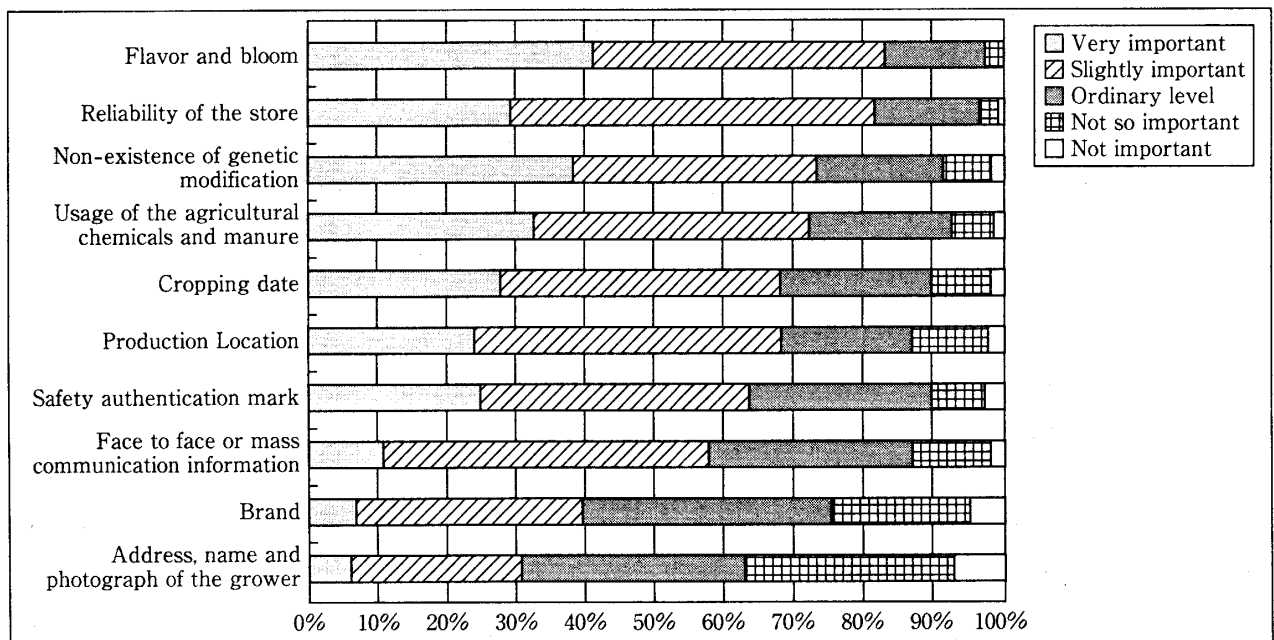


Chart 5.1 The important items in judging the safety of the greengrocery

The rate of "Very important" is as follows.

- Flavor and bloom : 41%
- Non-existence of genetic modification : 38%
- Usage of the agricultural chemicals and manure : 33%
- Reliability of the store : 30%
- Cropping date : 28%
- Safety authentication mark : 25%
- Production Location : 24%
- Face to face or mass communication information : 11%

- Brand : 7%
- Address, name and photograph of the grower : 6%

We can see that the last 3 items are not esteemed for the evaluation of the safety.

② The total safety of the greengrocery (Question 2)

- Think it safe : 3%
- Think it safe to a certain degree : 45%
- Can not say clearly : 32%
- Not think it so safe : 18%
- Not think it safe : 2%

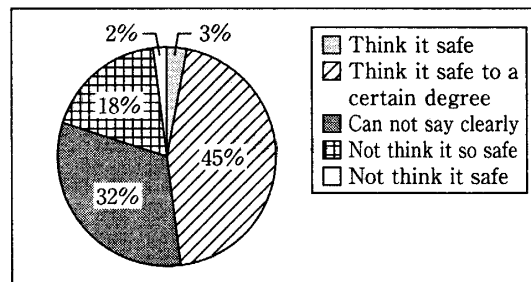


Chart 5.2 The total safety of the greengrocery

About 48% answered it safe.

However, consumers about 20% don't think so.

③ The improvement of the safety reliability for the greengrocery by introducing the system (Question 3)

Question is made by the 5 step evaluation whether the process of the production and the distribution become clear or not in using a traceability system.

- Become very high : 32%
- Become high to a certain degree : 53%
- Can not say clearly : 12%
- Do not change : 3%

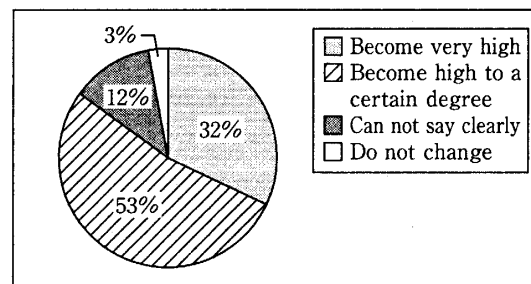


Chart 5.3 The improvement of the safety reliability for the greengrocery by introducing the system

There was no respondent who answered "Do not change at all".

We can see that about 85% of persons expect an effect by introducing the traceability system.

④ The means to get information on the greengrocery safeness (Question 4)

Traceability system includes the information such as number of times that agricultural chemical is used. The questionnaire is executed by what means the

greengrocery safeness is secured.

- The evaluation by the third party (the authentication mark etc.) : 47%.
- Making public all information at the storefront and the PC : 40%
- Inquiry whenever needed : 3%

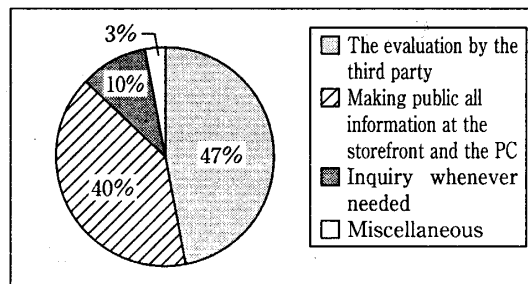
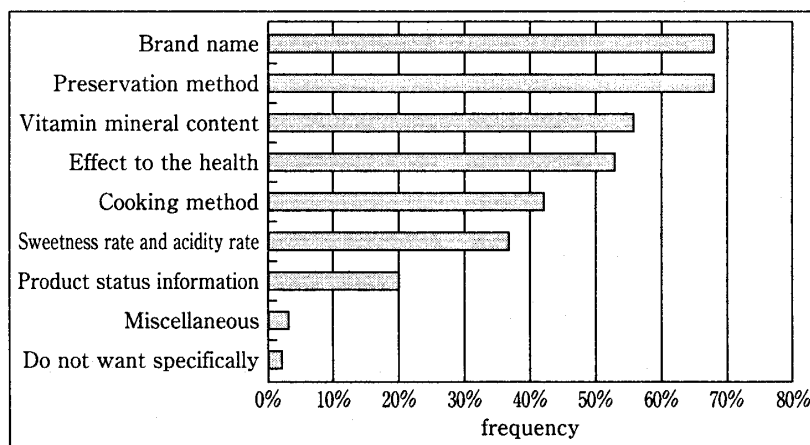


Chart 5.4 The means to get the information on the greengrocery safeness

We can see that nearly 90 percent of consumers want the push type information from the suppliers such as “evaluation by the third party” or “the information disclosure at the storefront and the PC”.

⑤ Other preferable information utilizing the traceability system (Question 5).

Questionnaire is executed concerning other preferable information utilizing the traceability system.



Chat 5.5 Other preferable information utilizing the traceability system

- Brand name : 68%
- Preservation method : 68%
- Vitamin mineral content : 56%
- Effect to the health : 53%
- Cooking method : 42%
- Sweetness rate and acidity rate : 37%
- Product status information (in the case of mail order) : 20%

Last 3 items were under 50%.

We can see that consumers want the information directly about safeness and healthiness.

⑥ The way of getting detailed information (Question 6)

Questionnaire is executed concerning preferable means to obtain information utilizing the traceability system.

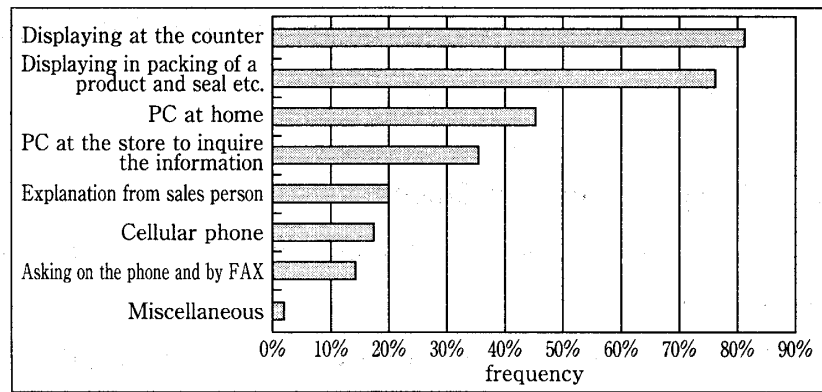


Chart5.6 The way of getting detailed information

- Displaying at the counter : 81%
- Displaying in packing of a product and seal etc. : 76%
- PC at home : 45%
- PC at the store to inquire the information : 35%
- Explanation from sales person : 20%
- Cellular phone (use two-dimensional bar code) : 17%
- Asking on the phone and by FAX : 14%

As the means to get preferable information, the top 2 items exceeded 50%. We can see that consumers want the information easily at the storefront.

⑦ The burden range of the premium cost of greengrocery in introducing traceability system (Question 7)

Questionnaire is executed as for the burden range of the premium cost of greengrocery in introducing traceability system. The result is as follows.

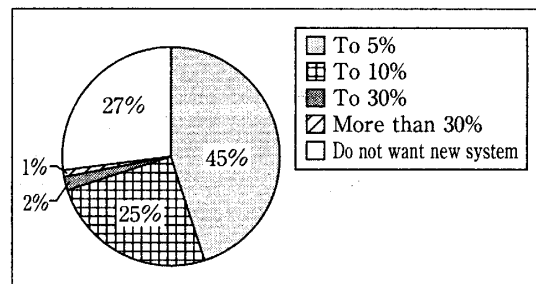


Chart5.7 The burden range of the premium cost of greengrocery in introducing traceability system

- To 5% : 45%,
- To 10% : 25%
- To 30% : 2%
- More than 30% : 1%
- Do not want new system : 27%.

The respondents of 73% think it payable to the operating expenses of the traceability system.



On the other hand, as for the burden of the cost, nearly half persons think that they can be bearable up to 5%.

### 5.2. Analysis using Key Graph

Key Graph analysis is executed selecting the item of Question 1 “Make importance a great deal”.

The results are similar to those of simple tabulation.

The co-appearance rate among “Flavor and bloom”, “Existence of genetic modification” and “Usage of agricultural chemicals and manure” is high.

While co-occurrence rate of “Safety authentication mark” is high which is located rather low in Chart 5.1.

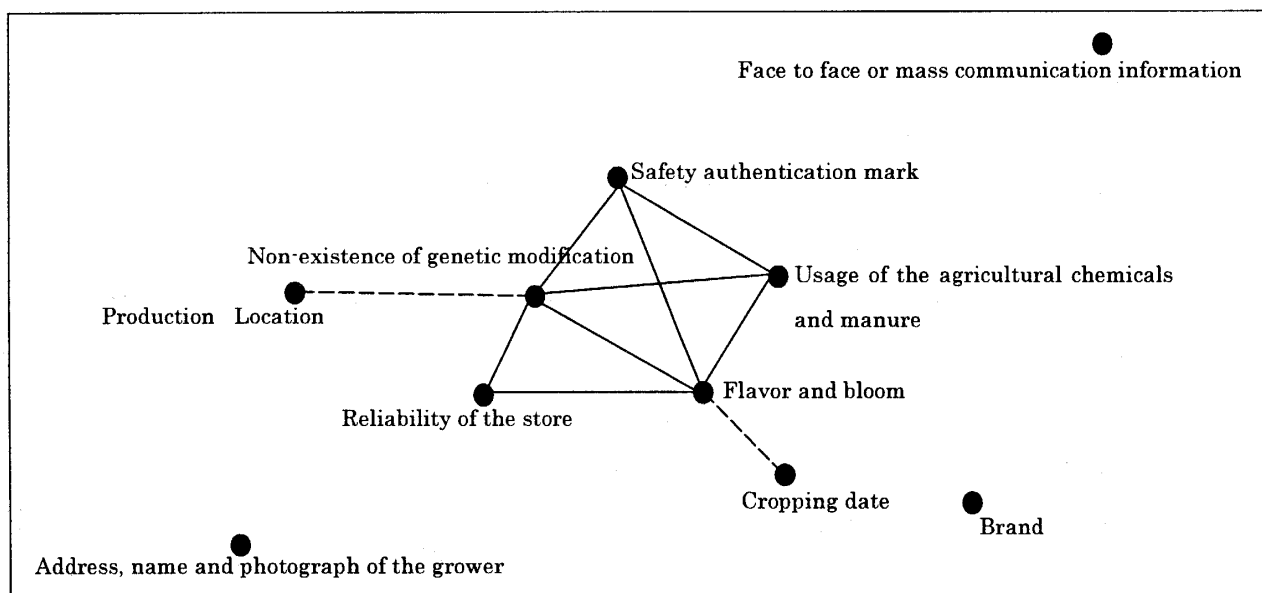


Chart 5.8 The relation of the items about safety of the greengrocery (5 categories)

Next, Key Graph analysis is executed concerning the items of “extremely esteeming” and “esteem to some extent” as is done at 5.1 (1) ①.

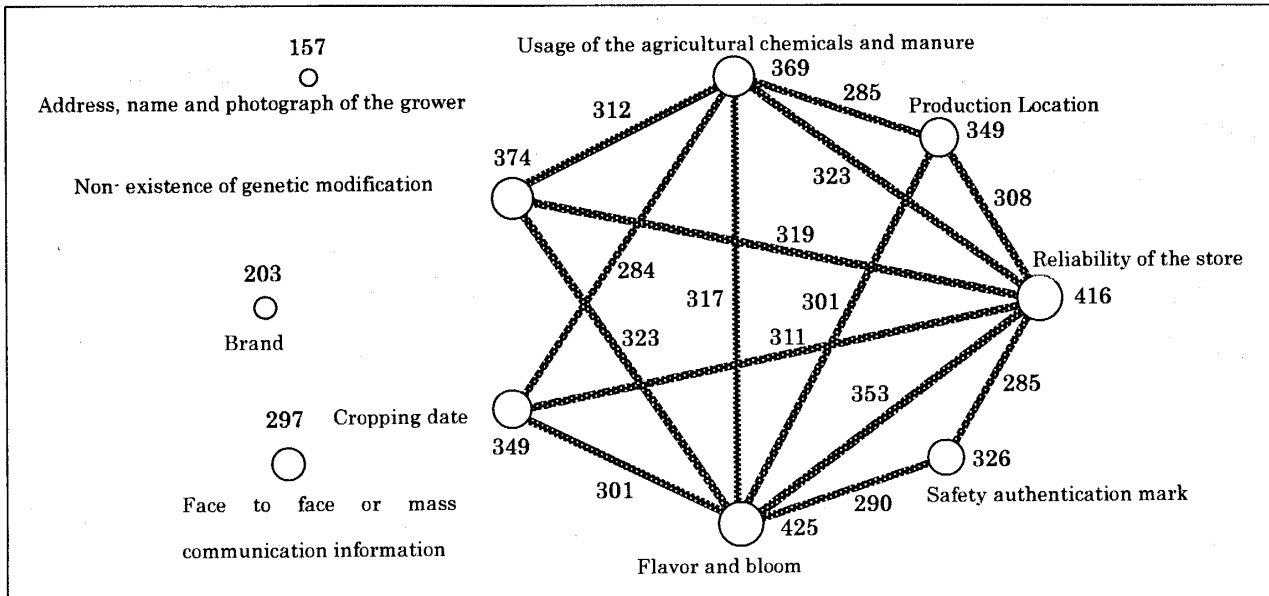


Chart5.9 The relation of the items about safety of the greengrocery (3 categories)

Comparing Chart 5.8 with Chart5.9, co-occurrence rate is high as for “Flavor and bloom”, “Reliability of the store”, “Non-existence of genetic modification” and “Usage of the agricultural chemicals and manure”.

On the other hand, “Face to face or mass communication information”, “Brand” and “Address, name and photograph of the grower” are not esteemed in judging safeness of greengrocery.

Consumers make importance on “Flavor and bloom” and “Reliability of the store” especially which is easy to confirm by consumers themselves.

### 5.3. Quantification Method analysis

#### (1) Quantification Method II

In analyzing following cases, 5 categories are transformed into 3 because of the statistical reason that we deal with psychological estimation.

Table5.1 Analyzing cases

Item		Q8:important items in judging the safety of greengrocery	notes
External criteria	①Q2:The general safety of the greengrocery	◎	
	②Q3:The reliability to the safety	◎	
	③Q7:The burden range of the premium cost of greengrocery	◎	Categories are integrated into two whether users bear the cost or not

## ① The general safety of the greengrocery

We use Quantification Method II in the analysis of the behavior in judging the safety of greengrocery.

We obtained the result in Chart5.10.

Most influential factor for judging the safety of greengrocery is “Non-existence of genetic modification”. Second one is “Safety authentication mark”. Third one is “Reliability of the store”. And fourth one is “Flavor and bloom”.

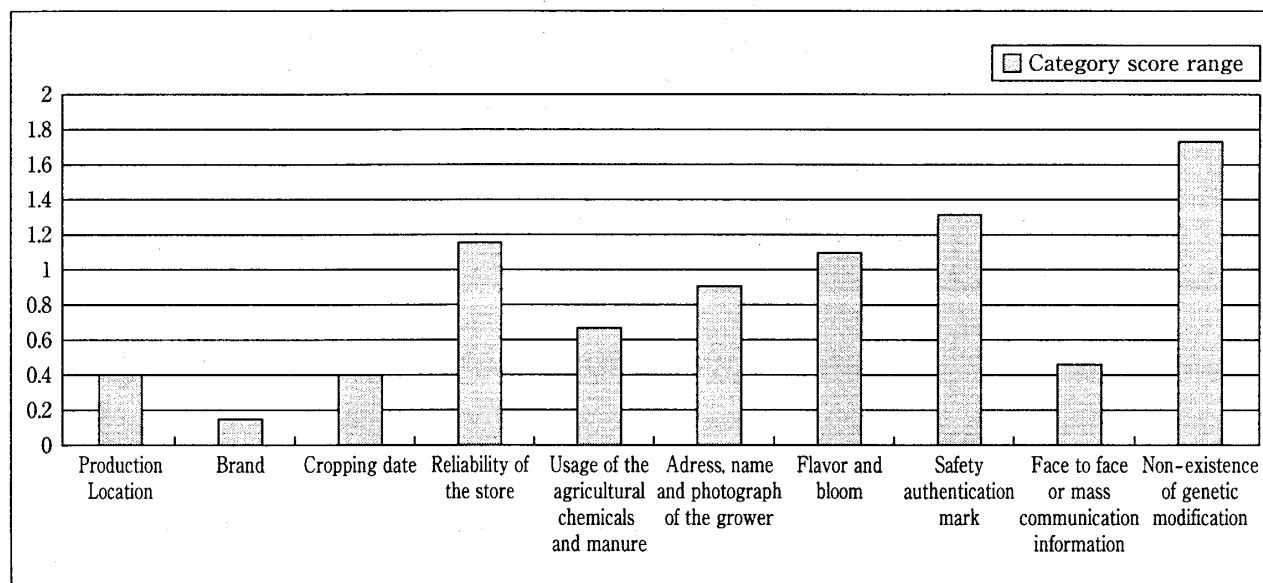


Chart5.10 Category Score Range of Judging the Safety of Greengrocery

These results are same as the result of analysis by the simple tabulation result of 5.1, and the Key Graph of 5.2 in general.

Outsiders certification such as “Non-existence genetic modification” and “Safety authentication mark” plays an important role in judging safety of greengrocery by consumers.

Consumers make importance on “Reliability of the store” and “Flavor and bloom” which is easy to confirm by consumers themselves.

The discriminate hitting ratio is 45.8%. It is not so good in this case.

For this reason, there may be a gap in the consciousness for the general safety of the greengrocery and in the activity during daily purchase.

## ② How to analyze “the reliability improvement to the safety of the greengrocery”

We use Quantification Method II in the analysis of the behavior about the reliability

improvement to the safety of the greengrocery.

We obtained the following result in Chart 5.11.

Most influential factor for the reliability improvement to the safety of the greengrocery is “Non-existence of genetic modification”. Second one is “Flavor and bloom”. Third one is “Safety authentication mark”. And fourth one is “Usage of the agricultural chemicals and manure”.

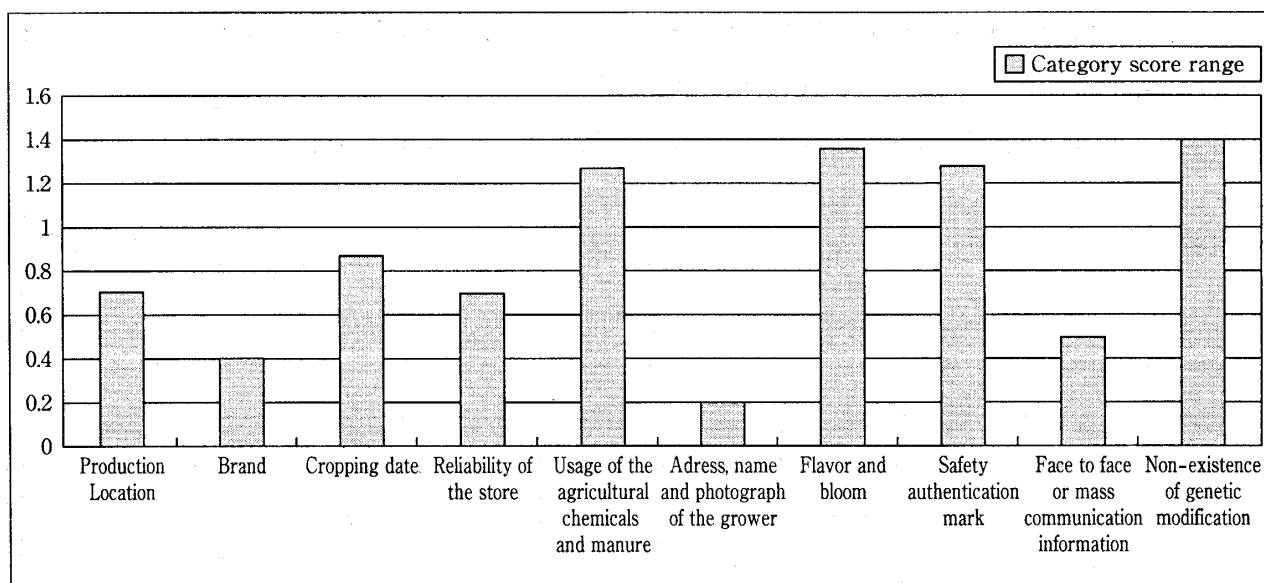


Chart 5.11 Category Score Range of Judging the reliability improvement to the safety of the greengrocery

These results are nearly same as the results of analysis by the simple tabulation result of 5.1 and Key Graph analysis of 5.2.

The discriminate hitting ratio is 56.7%. It is not so good in this case. Most influential factor of “Non-existence of genetic modification” and “Safety authentication mark” are not always confirmed at the store. This would be a big reason.

These information should be presented in constructing traceability system.

③ The analysis about “the burden range of the premium cost of greengrocery in introducing traceability system”

We use Quantification Method II in the analysis of the behavior about the burden range of the premium cost of greengrocery in introducing traceability system.

We obtained the following result in Chart 5.12.

Most influential factor for the burden range of the premium cost of greengrocery in introducing traceability system is “Safety authentication mark”. Second one is “Flavor

and bloom". Third one is "Reliability of the store". And fourth one is "Address, name and photograph of the grower".

We can understand that the operation load has big influence in this analysis compared with single variable analysis.

Items such as "Safety authentication mark" "Address, name and photograph of the grower" are the outsider authentication and the grower's disclosure to guarantee safety indirectly. On the other hand, "Flavor and bloom" and "Reliability of the store" are the items which can be confirmed by consumers themselves.

The discriminate hitting ratio is 68.6%. It is not so good in this case.

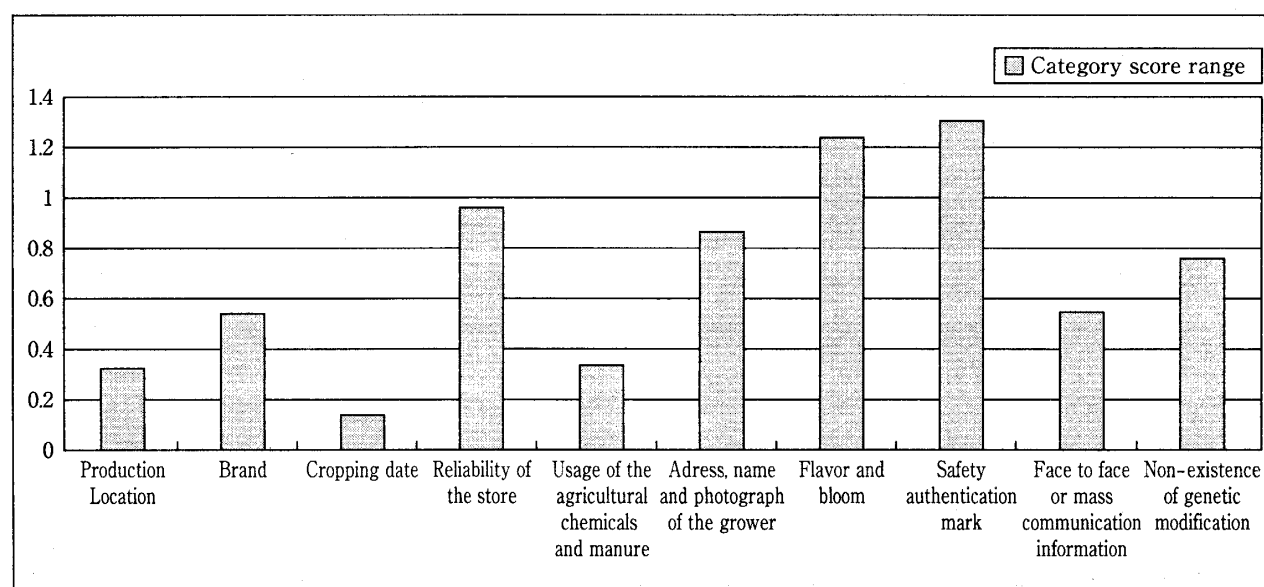


Chart 5.12 The burden range of the premium cost of greengrocery in introducing traceability system

However these information would be important in explaining the necessity of premium burden cost to consumers in introducing traceability system.

## (2) Quantification Method IV

Based on the reaction pattern of the examinee to the category data, we analyzed relation concerning each item of question 1.

As the index of the affinity, we adopted "Mahalanobis' generalized distance" and they are classified by the Quantification Method IV.

As is shown in Chart 5.13, following points are derived.

The items "Flavor and bloom", "Face to face or mass communication information" and "Reliability of the store" are located separately from other items. Vertical axis

would have meaning of characteristics of greengrocery itself.

On the other hand, horizontal axis would have meaning of outer evaluation.

### 5.4. The analysis by the Factor Analysis

We implemented factor analysis to every attributes such as “the gender” and “the period” concerning question 5 “the information consumer needs” and question 6 “the information acquisition method”.

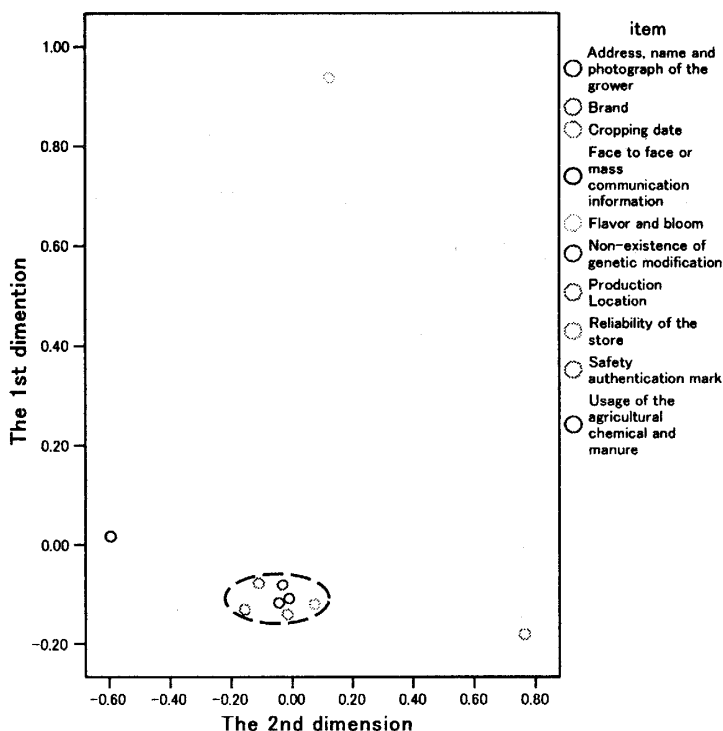


Chart 5.13 The Relation of the items about the safety of the greengrocery

As for the extraction method of the factor, “the principal axis factoring” was adopted, and as for the rolling-method, “the varimax rotation which is accompanied by the normalization of Kaiser as orthogonal rotation” was adopted.

Also, we confirmed the validity of the model in the KMO (Kaiser-Meyer-Olkin) specimen validity measure.

Table 5.2 Woman

① Question 5 “about the information consumer needs”

A. Woman (Table 5.2)

We can see that the 1st axis is “The factor about the cooking” which contains items of cooking method and a preservation method.

We can see that the 2nd axis is “the axis about the physical property of the food stuff” such

A. Woman	Factor after rotation		
	1	2	3
Q5① Brand name	.032	.327	-.141
Q5② Sweetness rate and acidity rate	.272	.464	.112
Q5③ Effect to the health	.265	.228	-.078
Q5④ Vitamin mineral content	.288	.404	.008
Q5⑤ Cooking method	.669	-.008	.019
Q5⑥ Preservation method	.434	.192	-.066
Q5⑦ Product status information	.040	.484	.120
Q5⑧ Miscellaneous	.030	.086	.189
Q5⑨ Do not want specifically	-.177	-.189	.575

as the product status information, sweetness rate and acidity rate, the vitamin mineral content.

From these results, we can see that women hope to have the information concerning cooking method and the preservation method rather than those of characteristics of the greengrocery itself.

KMO is 0.687 and we can confirm an appropriate common factor.

#### B. Man (Table5.3)

We can see that the 1st axis is “the factor about the health” such as the vitamin mineral content. 2nd axis is “the factor about the cooking” such as the cooking method and the preservation method. 3rd axis is “the factor about the additional value and related information”.

The order of the importance of the main factor axis is reversed with those of the woman.

Generally, men rarely cook so they may stress much importance on effect to the health.

KMO is 0.626 and we can confirm an appropriate common factor.

#### C. Younger than 30 years old (Table5.4)

1st axis is “the factor about cooking” such as the cooking method and the preservation method. 2nd axis is “the axis

Table5.3 Man

B. Man	Factor after rotation		
	1	2	3
Q5① Brand name	.007	-.030	.741
Q5② Sweetness rate and acidity rate	.263	.206	.055
Q5③ Effect to the health	.317	.245	.128
Q5④ Vitamin mineral content	.738	-.036	-.006
Q5⑤ Cooking method	.074	.702	-.023
Q5⑥ Preservation method	.219	.430	.084
Q5⑦ Product status information	.199	.056	.246
Q5⑧ Miscellaneous	-.031	.069	.061
Q5⑨ Do not want specifically	-.221	-.175	-.279

Table5.4 Younger than 30 years old

C. Younger than 30 years old	Factor after rotation		
	1	2	3
Q5① Brand name	-.104	.360	.180
Q5② Sweetness rate and acidity rate	.082	.598	.117
Q5③ Effect to the health	.173	.457	.134
Q5④ Vitamin mineral content	.062	.162	.266
Q5⑤ Cooking method	.915	.133	.030
Q5⑥ Preservation method	.420	.110	.186
Q5⑦ Product status information	.070	.116	.075
Q5⑧ Miscellaneous	.088	.216	.002
Q5⑨ Do not want specifically	-.125	-.079	-.728

about effect to the health of the food stuff” such as the sweetness rate and acidity rate, the effect to the health. 3rd axis is “the factor about the additional value of the food stuff” such as vitamin and the mineral content.

These results resemble to the case of woman. It may be because that the recent youngster is gourmet and the opportunity to cook personally increased.

KMO is 0.61 and we can confirm an appropriate common factor.

#### D. Thirties (Table5.5)

1st axis is “The factor about the cooking” which contains a cooking method and a preservation method.

2nd axis is “the axis about the health” such as the vitamin mineral content, sweetness rate and acidity rate, the effect to the health.

3rd axis is “the factor about the brand and the additional value”.

It is similar to the case with the age younger than 30 years old.

KMO is 0.634 and we can confirm an appropriate common factor.

Table5.5 Thirties

D. Thirties	Factor after rotation		
	1	2	3
Q5① Brand name	.139	.006	.745
Q5② Sweetness rate and acidity rate	.282	.320	.126
Q5③ Effect to the health	.154	.242	.350
Q5④ Vitamin mineral content	-.059	.694	.202
Q5⑤ Cooking method	.740	-.070	.012
Q5⑥ Preservation method	.521	.220	.137
Q5⑦ Product status information	-.102	.222	.310
Q5⑧ Miscellaneous	-.143	-.366	-.051
Q5⑨ Do not want specifically	-.132	-.085	-.153

#### E. Fifties (Table5.6)

1st axis is “the factor about health” such as the preservation method, the vitamin mineral content, the effect to the health.

2nd axis is “the factor about the physical character of the food stuff” such as the

Table5.6 Fifties

E. Fifties	Factor after rotation			
	1	2	3	4
Q5① Brand name	.112	.012	.034	.782
Q5② Sweetness rate and acidity rate	.200	.902	.131	.042
Q5③ Effect to the health	.358	-.092	.189	-.017
Q5④ Vitamin mineral content	.413	.229	.081	-.040
Q5⑤ Cooking method	.255	.073	.011	.010
Q5⑥ Preservation method	.452	.213	.201	-.022



sweetness rate and acidity rate, product order information.

This case is different from the result of women and the health-consciousness is revealed on every aspects of life.

KMO is 0.558 and we can confirm an appropriate common factor.

F. Sixties or more  
(Table 5.7)

Table 5.7 Sixties or more

F. Sixties or more	Factor after rotation			
	1	2	3	4
Q5① Brand name	-.071	.242	.287	.517
Q5② Sweetness rate and acidity rate	.350	.265	.283	.049
Q5③ Effect to the health	.493	.202	-.095	-.040
Q5④ Vitamin mineral content	.418	.457	.096	.066
Q5⑤ Cooking method	.645	-.091	.195	.025
Q5⑥ Preservation method	.474	-.032	.031	.125
Q5⑦ Product status information	-.031	.451	.027	.066
Q5⑧ Miscellaneous	.082	.041	.565	-.034
Q5⑨ Do not want specifically	-.190	.000	.230	-.543

1st axis is “The factor about cooking” such as the cooking method, and the preservation method.

2nd axis is “the factor about the food physical quality” such as the vitamin mineral content, and the product status information.

This case resembles to the case of women and health-consciousness is revealed on every aspects of life.

KMO (Kaiser-Meyer-Olkin) is 0.645 and we can confirm an appropriate common factor.

② Question 6: “The way of getting detailed information”

Executing factor analysis on every attribute in the same way, we get following results.

A. Woman

1st axis is “the PC equipment which is a new medium” such as the PC at home, PC at the store to inquire the information. 2nd axis is “the traditional telephone line” such as a phone and a fax. 3rd axis is “the face to the face communication type” such as the explanation from the sales person.

KMO is 0.662 and we can see that it is an appropriate common factor.

We can see that the woman operates a PC fairly well and that it is recognized as a mean of gathering information.

B. Man

1st axis is the “the traditional means” such as phone and a fax. 2nd axis is “the recent means” such as the PC and the cellular phone.

KMO is 0.618 and we can confirm an appropriate common factor.

C. Younger than 30 years old

1st axis is “the recent means” such as PC at the store to inquire information, the PC and the cellular phone.

2nd axis is “the traditional means” such as asking on the phone and by fax.

3rd axis is “displaying in the packing of a product and the seal etc.” and “the dissemination by the recent new media” is required.

KMO is 0.588 and we can confirm an appropriate common factor.

D. Sixties or more

1st axis is “recent and traditional means” such as the cellular phone, the phone and a fax.

2nd axis is “the means which can easily be confirmed” such as the display and the explanation from the sales person.

3rd axis is “the means to acquire positively” such as PC at the store to inquire information, seal on the pack.

Basically, means to get information by an easy way are required.

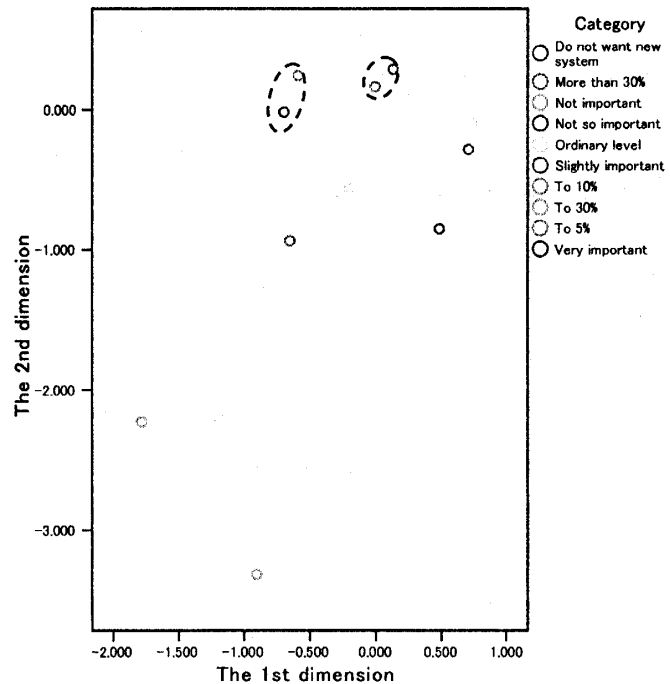


Chart 5.14 “Usage of the agricultural chemicals and manure” and “The burden range of the premium cost”

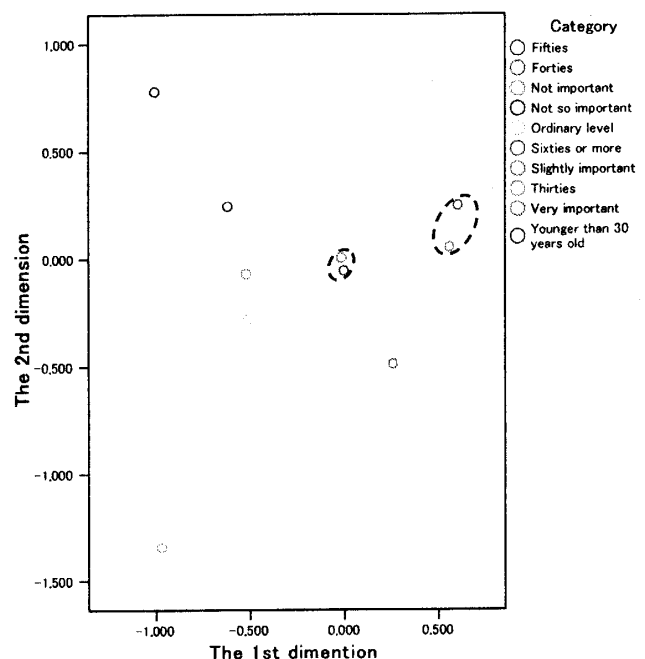


Chart 5.15 “Usage of the agricultural chemicals and manure” and “The age”

KMO is 0.625 and we can confirm an appropriate common factor.

5.5. Correspondence analysis

“Usage of the agricultural chemicals and manure” and “Non-existence of genetic modification” are critical items in the analysis so far, therefore the relation of some attributes with related two items are analyzed.

① “ Usage of the agricultural chemicals and manure” and “The burden range of the premium cost”

Consumers who make much importance on “Usage of the agricultural chemicals and manure” think it bearable to owe cost burden to 5%, while the case that consumers who make importance to a certain degree shows 10% (cf. Chart5.14).

The contributing rate of the inertia is 69.1% at 1st dimension and 21% at 2<sup>nd</sup> dimension.

② “Usage of the agricultural chemicals and manure” and “The age”

Consumers who think much of “the usage of the agricultural chemicals and manure” are sixties.

Fifties think it important to some extent (cf. Chart5.15).

The contributing rate of the inertia is 90.6% at 1st dimension, 0.84% at 2<sup>nd</sup> dimension and it is

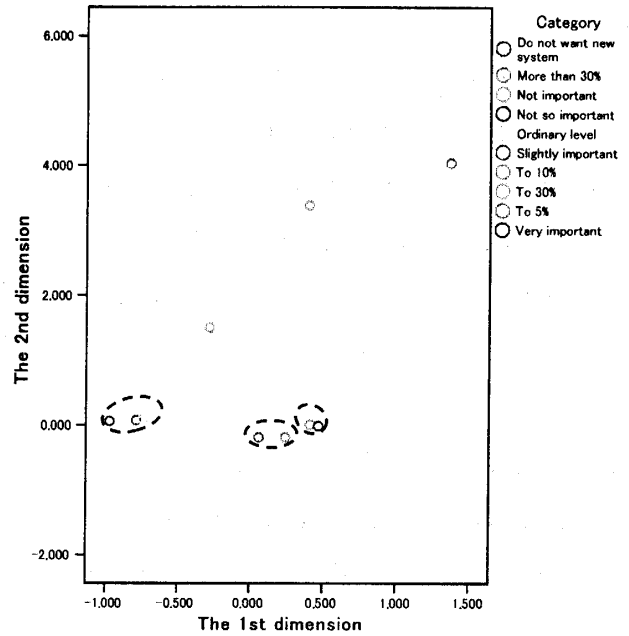


Chart 5.16 “Non-existence of genetic modification” and “The burden range of the premium cost”

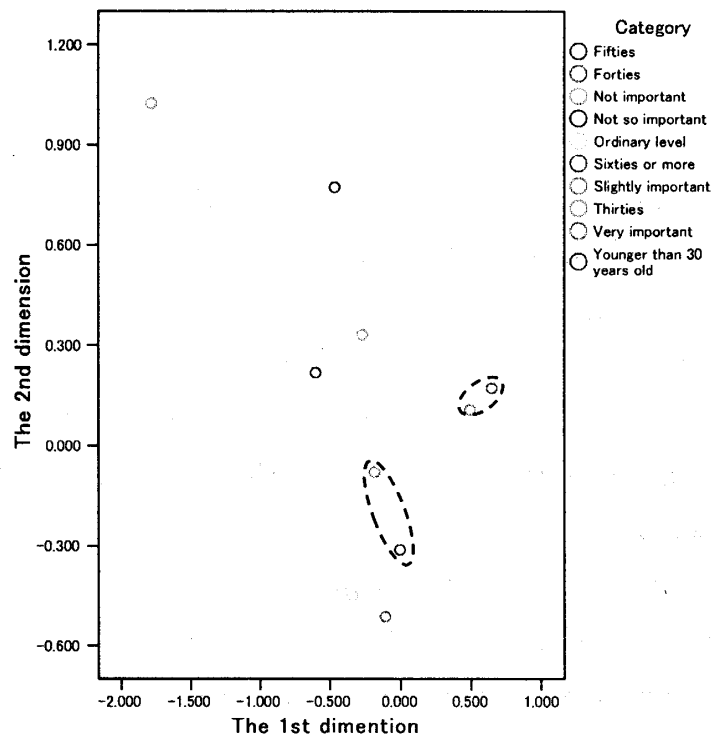


Chart5.17 “Non-existence of genetic modification” and “The age”

possible to explain only by 1<sup>st</sup> dimension.

③ “Non-existence of genetic modification” and “The burden range of the premium cost”

Consumers who make importance on “Non-existence of genetic modification” think it bearable to 5% to 10% (cf. Chart5.16).

The contributing rate of the inertia is 59.4% at 1<sup>st</sup> dimension and 34.7% at 2<sup>nd</sup> dimension.

④ “Non-existence of genetic modification” and “The age”

Consumers who make much importance on “Non-existence of genetic modification” are sixties or more, while the case that consumers who make importance to a certain degree are fifties (cf. Chart5.17).

The contributing rate of the inertia is 77.1% at 1<sup>st</sup> dimension and 21.7% at 2<sup>nd</sup> dimension.

### 5.6. Multi Correspondence Analysis

We execute the multi correspondence analysis to Q1, Q5, Q6 in order to find the correlation of each items.

① The important items in judging the safety (Q1)

As is shown in the Chart5.18, we can see that the comparatively high relation between items excepting the case of “Address, name and the photograph of the grower”.

Among them, the relation of “Flavor and the bloom”, “ Non-existence of genetic modification”, “Cropping date” “Reliability of the store”, “Usage of the agricultural chemicals and manure”, “ Safety authentication mark” and

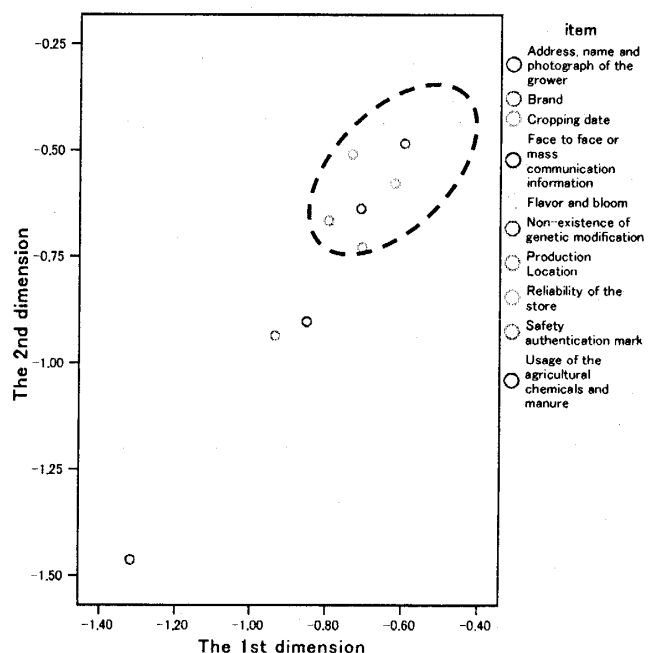


Chart5.18 “The important items in judging the safety of greengrocery”

“Production Location” are high which are followed by the relation about items such as “Face to face or mass communication information” and “Brand”.

② “Other preferable information utilizing the traceability system” (Q-5)

As is shown in the Chart 5.19, we can see that the comparatively high relation with health between the items such as “Vitamin mineral content”, “Effect to the health”, “Sweetness rate and acidity rate” and “Preservation method”.

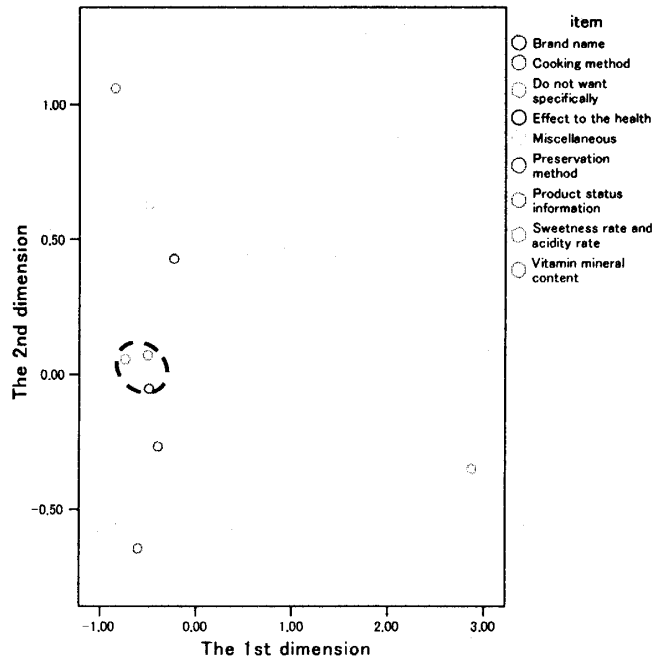


Chart 5.19 “Other preferable information utilizing the traceability system”

③ “The way of getting detailed information” (Q-6)

We can see that the high relation of the traditional types such as “Display at the counter”, “Displaying in packing of a product and seal etc.” as is shown in the Chart 5.20.

We can also see that the high relation among the new media which are called “PC at home” and “PC at the store to inquire the information”.

5.7. The comparison of the analysis by the Key Graph and the Quantification Method IV

Both methods are same in making map.

But the analysis results are different in these points.

(1) Quantification Method calculates eigen value. Therefore each location of item has fixed quantity meaning.

(2) In the Key Graph, link among items has its own meaning as a co-occurrence rate.

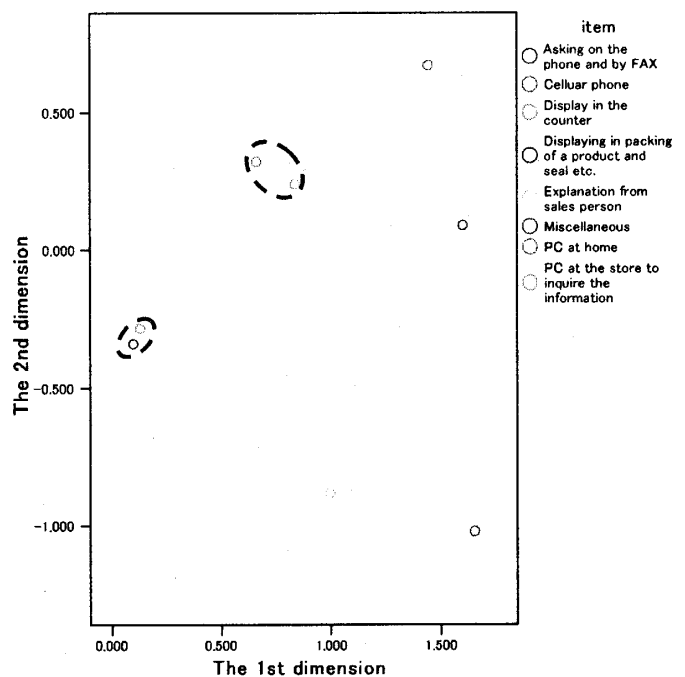


Chart 5.20 “The way of getting detailed information”

(3) Key Graph has double structure. Link among cluster is also exhibited as well as those among items.

Quantification Method can not display link as Key Graph does.

Quantification Method displays fixed distance of items which is calculated by eigen value, so flexible positioning utilizing relation among items is hard to execute.

On the other hand, Key Graph can easily show flexible positioning utilizing relation among items.

Both methods are quite different. So it is hard to compare on the same standard.

Comparing Chart 5.8, 5.9 with Chart 5.13, "Face to face or mass communication information" is located far from other items in both methods.

There are cases that Key Graph reveal co-occurrence condition explicitly which Quantification Method IV can not.

Key Graph Method is effective in the case to grasp common factor of judgment based upon personal sense of value such as this research.

## 6. CONCLUSION

In building Traceability of the food, questionnaire investigation for consumers is executed.

As is shown in the result of factor analysis, expectation for the traceability system is slightly different by sex and age.

Further study should be executed in designing new traceability system.

On the whole, consumers understand the necessity of traceability system and they think they are bearable to the cost for using the new system if effective information were provided.

In Osaka prefecture, prototype traceability system is under building.

New system should be built for growers to input the data easily and for consumers to derive effective information easily which secure safety of food.

In conclusion, we appreciate Ms. Yuki Yokomichi and Mr. Gen Suda for their helpful support of work.

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## APPENDIX : QUESTIONNAIRE CONCERNING THE RELIEF AND SAFETY OF GREENGROCERY (VEGETABLES AND FRUITS)

## I We make question about the relief and safety of greengrocery.

Q-1 What are important points in judging the safety of greengrocery? Choose one level for each item.

Importance	Very important	Slightly important	Ordinary level	Not so important	Not important
① Production Location	5	4	3	2	1
② Brand (The high brand and the specialty goods)	5	4	3	2	1
③ Cropping date	5	4	3	2	1
④ Reliability of the store	5	4	3	2	1
⑤ Usage of the agricultural chemicals and manure	5	4	3	2	1
⑥ Address, name and photograph of the grower	5	4	3	2	1
⑦ Flavor and bloom	5	4	3	2	1
⑧ Safety authentication mark	5	4	3	2	1
⑨ Face to face or mass communication information	5	4	3	2	1
⑩ Non-existence of genetic modification	5	4	3	2	1

Q-2 Do you think greengrocery (vegetable and fruits) are safe on the whole?

Select only one and mark the sign of ○.

- |   |
|---|
| ① Think it safe    ② Thinks it safe to a certain degree    ③ Can not say clearly<br>④ Not think it so safe    ⑤ Not think it safe |
|---|

## II We make question about the traceability system.

(Note) The traceability system is a system which can trace the past history of greengrocery.

Q-3 Do you think reliability of safety of food upraise if you use traceability system?

Select only one and mark the sign of ○.

- |   |
|---|
| ① Become very high    ② Become high to a certain degree    ③ Can not say clearly<br>④ Do not change    ⑤ Do not change at all |
|---|

Q-4 Information about the usage of agricultural chemicals is recorded after the system is introduced. How is the safety of greengrocery is secured using those information?

Select only one and mark the sign of ○.

- |   |
|---|
| ① All information are made public at the store or by PC.<br>② Authentication party or administrative office evaluate and let the information public.<br>Consumers confirm the result such as authentication mark.<br>③ Consumers inquire the information whenever they want to know.<br>④ Miscellaneous ( ) |
|---|



Q-5 What kind of information do you want?

Select one or plural items and mark the sign of ○.

- |  |  |
|--|--|
| ① Brand name (It includes a production district) | ② Sweetness rate and acidity rate                        |
| ③ Effect to the health                           | ④ Vitamin mineral content                                |
| ⑤ Cooking method                                 |  |
| ⑥ Preservation method                            | ⑦ Product status information (in the case of mail order) |
| ⑧ Miscellaneous ( )                              | ⑨ Do not want specifically                               |

Q-6 What are desirable methods to obtain information after introducing new system?

Select one or plural items and mark the sign of ○.

- |   |   |
|---|---|
| ① Display at the counter                          | ② Display in packing of a product and seal etc. |
| ③ Explanation from sales person                   | ④ Asking on the phone and by FAX                |
| ⑤ PC at the store to inquire the information      | ⑥ PC at home                                    |
| ⑦ Cellular phone (using two-dimensional bar code) | ⑧ Miscellaneous ( )                             |

(Note) Latest cellular phone has a function to read bar code using attached camera function.

Q-7 How much premium cost can you bear after introducing new system?

Select one or plural items and mark the sign of ○.

- |                          |          |          |                 |
|--------------------------|----------|----------|-----------------|
| ① To 5%                  | ② To 10% | ③ To 30% | ④ More than 30% |
| ⑤ Do not want new system |          |          |                 |

III We hear about yourself last of all.

(1) Sex	① Woman	② Man
(2) Age	① Younger than 30 years old	② Thirties
	③ Forties	④ Fifties
	⑤ Sixties or more	