

Rice Prices and Rice-Purchasing Behaviors of Japanese Consumers

By

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Summary : This paper analyzed rice-purchasing behaviors through a questionnaire survey of 461 consumers in Japan. Two main analyses were undertaken. First, factors affecting consumers' decision-making in selecting the most preferable rice from various price ranges were examined using a multiple regression model. Second, consumer purchasing behaviors when rice prices change were classified into some types, and factors affecting them were examined using the method of quantification type II. The results obtained from the analyses are as follows. First, consumers' selection of rice was affected not only by the economic factors which influenced the consumption expenses per capita such as household gross income and family size but also by the occupations of purchaser and the points of interest when purchasing rice. Second, consumer purchasing behaviors with rice price changes could be classified into four types : Type 1 (would neither change the quantity nor the brand of rice) ; Type 2 (would not change the quantity but the brand of rice) ; Type 3 (would change the quantity but not the brand of rice) ; and Type 4 (would change the quantity and the brand of rice). According to the questionnaire survey, Type 1 constituted 10.4% of the total ; Type 2, 52.3% ; Type 3, 8.7% ; and Type 4, 28.6%. Third, the quantity of purchased rice would barely increase even if rice prices would fall dramatically. Fourth, household gross income, family size, points of interest when purchasing rice, occupation, age, and residence area were the causes of different purchasing behaviors of Type 1-Type 4.

Key words : selection of rice, questionnaire survey, regression analysis, quantification type II

1. Introduction

In the current WTO agriculture negotiations, member countries are discussing the reduction of duty rates on agricultural products. In present-day Japan, there is little imported rice except Minimum Access Rice because of the high tariff. However, if the import tariff on rice is substantially reduced, cheaper rice from abroad will be imported in large quantities. On the other hand, the profitability of rice farming is declining every year since producers' rice prices have gradually dropped in the last decade. Hence farmers and agricultural cooperatives will have to reduce the overall costs of rice more than before. At the same time, it will be important for them to precisely analyze the trends in rice consumption and prepare effective measures to cope with these trends.

How much of which type of rice do Japanese con-

sumers purchase? How much are they willing to pay for polished rice per ten kilograms? What will happen to consumer purchasing behaviors when rice prices change? Clarifying these questions is necessary to predict future trends in rice consumption.

Many studies focusing on rice consumption have been carried out in various ways. In this area of study, there have been two major approaches. One was the estimation of demand function using statistical data including the Household Economy Survey data¹⁻⁴⁾, while the other was the analysis of consumers' preference as to rice and their purchasing behavior using data obtained from questionnaires or interviews^{5,6)}. As a result of these previous studies, the following points were clarified : (1) the price elasticity of demand for rice was inelastic ; (2) the household income level influenced the purchase of rice ; (3) the consumption patterns of rice depended on the size and age composition

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of household members ; and (4) many consumers were concerned about the safety and quality of rice. These points are useful to understand the actual trends of rice consumption and establish sales strategies for domestic rice.

However, the above mentioned studies did not fully answer the questions concerning which factors strongly affected consumers' selection of rice from various price ranges and which type of rice would be purchased when rice prices would change. It is important to clarify these questions in order to predict future trends in rice consumption.

Therefore, this paper analyzes the characteristics of consumer purchasing behaviors for rice and the factors affecting it through a questionnaire survey of consumers from all over the country. In this paper, two main analyses are undertaken. First, factors affecting consumers' decision-making in selecting the most preferable rice from various price ranges are examined using a multiple regression model. Second, consumer purchasing behaviors when rice prices change are classified into some types, and factors affecting them are examined using the method of quantification type II.

2. Outlines of Questionnaire

The questionnaire survey was conducted online in 2006. Six hundred consumers (women who could access the Internet from a personal computer at home) who purchased rice and cooked it at home in the previous year were randomly selected from the database (thirty-four thousand women were registered) of an online research company and were asked to respond to the questionnaire. After verifying the replies, 461 consumers (households) were finally selected as subjects for analysis.

The questionnaire was composed of the following sections : (1) quantity of purchased rice and places where rice was bought ; (2) factors taken into consideration when purchasing rice ; (3) brand name, producing

district, type of rice, and price of rice purchased recently ; (4) actual condition of rice consumption ; and (5) rice-purchasing behaviors when rice prices change.

The details of the survey respondents are shown in Table 1. Approximately 60% of them lived in the Kanto and Kansai areas which are major consumption regions. The proportion of full-time housewives was 44.5% ; part-time workers, 23.6% ; and employees of companies, 17.6%. The average age of respondents was 37.3 years, and 41.7% were in their 30s. With respect to family size, the percentages of households with two, three, and four members constituted approximately 25% each of the total number of households. The rate of households with an annual income of 4-8 million yen was 49.7% (the average annual income of households was estimated at approximately 6 million yen). The average annual quantity of purchased rice amounted to 36.9 kg per person.

Moreover, according to the Household Economy Survey conducted by the General Affairs Ministry in 2006, the average family size was 2.8 and the average annual income was 5.7 million yen. These figures are similar to the average family size and annual income of the respondents of this study, as shown in Table 1. Furthermore, according to the Household Economy Survey of 2000, the quantity of rice annually purchased was 30.4 kg per person.

Thus, since the characteristics of the questionnaire survey respondents almost corresponded to that of the respondents of Household Economy Survey (although, there is a possibility that the survey respondents have a bias toward young people), the results obtained from the questionnaire analysis could be expected to reflect a general tendency in Japan.

3. Actual Conditions of Rice Purchase and Factors Affecting Them

Rice prices have been on the decrease because of the relaxation of supply and demand, the deregulation of

Table 1 Details of Survey Respondents

Region of Residence	Average	Rate of households (%)					
		Hokkaido, Tohoku	Kanto	Tozan, Hokuriku, Tokai	Kinki	Chugoku, Shikoku, Kyusyu	Total
	—	9.1	43.6	11.9	21.5	13.9	100.0
Occupation	—	Housewife	Part-timer	Company Employee	Self-employed	Others	Total
		44.5	23.6	17.6	3.3	11.0	100.0
Age (years)	37.3	< 30	30-40	40-50	50-60	60≤	Total
		19.5	41.7	28.8	9.3	0.7	100.0
Family Size (no. of persons)	3.1	1	2	3	4	5≤	Total
		8.2	24.5	25.9	27.5	13.9	100.0
Household Income (ten thousand yen)	—	< 400	400-800	800-1200	1200-1600	1600≤	Total
		23.6	49.7	20.6	3.7	2.4	100.0
Annual Purchases of Rice (kg/person)	36.9	< 19.9	20.0-40.0	40.0-60.0	60.0-80.0	80.0≤	Total
		15.4	46.0	20.6	13.7	4.3	100.0

Note: The survey respondents comprised 461 women who purchased rice and cooked it at home in the previous year. They were randomly selected from the database of an online research company.

Table 2 Rate of Households Classified by Prices of Purchased Rice

Price of Polished Rice (yen/10 kg)	Rate of Households (%)
6,000≤	7.2
5,500–6,000	4.3
5,000–5,500	6.1
4,500–5,000	6.7
4,000–4,500	9.3
3,500–4,000	24.1
3,000–3,500	18.0
2,500–3,000	18.4
2,000–2,500	3.3
<2,000	2.6
Total	100.0

the rice distribution system, and the decline in household disposable income caused by the depression in recent years. According to Table 2, the price range with the highest percentage of households (23.5%) was 3,500–4,000 yen per 10 kg of polished rice. On the other hand, there were some households (7.2%) purchasing rice priced at more than 6,000 yen per 10 kg. Most of the rice priced at more than 4,000 yen was good tasting rice such as Koshihikari, rice from famous producing districts such as Niigata, or organic rice.

Then, what factors affected consumers' selection of rice from various price ranges? The following seven factors were considered to be related to the selection: (1) household gross income (X_1), (2) family size (X_2), (3) quantity of purchased rice (X_3), (4) points of interest when purchasing rice (X_4 – X_6), (5) occupation of purchaser (X_7 – X_9), (6) age of purchaser (X_{10}), and (7) residence area of purchaser (X_{11}). The three factors of (1), (2), and (4) were already pointed out as factors which influenced the purchase of rice in preceding studies^{4,5}.

Therefore, the following multiple regression model was estimated in order to clarify the influence of the above mentioned seven factors on consumers' selection of rice.

$$Y = \alpha + \sum \beta_i \cdot X_i + \mu$$

Where,

- Y : price of rice purchased in each household (yen/10 kg)
- X_1 : household gross income (ten thousand yen/year)
- X_2 : family size (no. of persons)
- X_3 : quantity of rice purchased in each household (kg/month)
- X_4 : dummy variable (1=households that are concerned with taste of rice ; 0=others)

X_5 : dummy variable (1=households that are concerned with safety of rice ; 0=others)

X_6 : dummy variable (1=households that are concerned with functionality of rice ; 0=others)

X_7 : dummy variable (1=office workers or self-employed workers ; 0=others)

X_8 : dummy variable (1=public employees or specialists ; 0=others)

X_9 : dummy variable (1=part-timers ; 0=others)

X_{10} : age (years)

X_{11} : dummy variable (1=residence area near rice field ; 0=others)

α : constant term

β_i : regression coefficient

μ : error term

First, the coefficients of the above regression model were estimated. However, the coefficients of X_{10} and X_{11} were not statistically significant. Therefore, X_{10} and X_{11} were excluded from the regression model, and the coefficients of X_1 – X_9 were estimated. Table 3 shows these results.

The multiple correlation coefficient (0.48) and the coefficient of determination (0.233) are not so high. This is often observed in analysis using cross section data of individual consumers (it seems that the degree of the influence of each factor (X_1 – X_9) was different in each consumer and that other factors except X_1 – X_9 may have affected consumers.) The coefficients of explanatory variables except X_8 and X_9 have good t-values as a whole.

It is obvious from values of the standard regression coefficient of the explanatory variables that points of interest when purchasing rice (X_4 – X_6), household gross income (X_1), quantity of purchased rice (X_3), and family size (X_2) affected consumers' selection of rice from various price ranges. Especially the values of X_4 – X_6 are relatively large. This means that consumers considering the taste or safety of rice tended to purchase higher priced rice such as Niigata Koshihikari or organic rice. With regard to the household gross income, the high income class tended to purchase higher priced rice.

Among households with almost the same amount of income, households which consumed a larger amount of rice and had many family members purchased relatively low-priced rice.

On the other hand, the occupations (X_7 – X_9) of purchasers also affected selection of rice. However, the degree of its influence was smaller than the above-mentioned four factors. From standard regression coefficients, it is certain that office worker, self-employed, public employee, and specialist tended to purchase

Table 3 Factors Affecting Consumers' Selection of Purchased Rice (Result of Regression Analysis)

Explanatory Variable	Partial Regression Coefficient	Standardized Regression Coefficient	t-value	Test of Significance ***1% level *10% level
X ₁ : Household Gross Income	0.665	0.171	3.86	***
X ₂ : Family Size	-162	-0.145	-2.69	***
X ₃ : Quantity of Purchased Rice	-35	-0.171	-3.33	***
Points of Interest When Purchasing Rice "price of rice" is treated as a benchmark				
X ₄ : Dummy 1 (taste of rice)	909	0.334	6.91	***
X ₅ : Dummy 2 (safety of rice)	888	0.209	4.56	***
X ₆ : Dummy 3 (functionality of rice)	652	0.169	3.68	***
Occupation of Respondents "full-time housewives" are treated as a benchmark				
X ₇ : Dummy 4 (office workers or self-employed)	238	0.079	1.70	*
X ₈ : Dummy 5 (public employees or specialists)	359	0.065	1.47	
X ₉ : Dummy 6 (part-timers)	149	0.048	1.05	
Constant	3,641		17.17	***
The Coefficient of Determination				0.233
Multiple Correlation Coefficient				0.48

higher priced rice in comparison with full-time housewives. It seems that differences between full-time housewives and working women in time for shopping influence the standard regression coefficients ($X_7 - X_9$).

These results mean that consumers' selection of rice from various price ranges was affected not only by economic factors concerned with the consumption expenditure per capita such as household gross income, family size, and quantity of purchased rice but also by points of interest when purchasing rice and the occupation of the purchaser. In the previous studies, the relationship between income (or family constitution) and the average purchase price of rice was analyzed using the Household Economy Survey data⁴⁾, and the points of interest when purchasing rice were clarified based on the questionnaire survey⁵⁾. The significance of the analysis in this section is that the impact of the above-mentioned factors on consumers' selection of rice was estimated quantitatively at the same time.

4. Consumer Reaction to Changes in Rice Prices and Factors Affecting It

The factors affecting consumers' selection of rice at the present rice prices were clarified in the preceding section. Next, consumer reaction to changes in rice prices and factors affecting it are examined in this section.

The questionnaire asked consumers about their intention of purchasing rice when rice prices would be doubled or drop to half. The assumption of such a price fluctuation was based on drastic rice price changes since the 1990s. Especially in the autumn of 1993 when the rice crop was damaged by cold weather, the producer price of free-market rice, which more sensitively

reflected supply and demand, increased by 70% in comparison with the same month of the previous year. This raised the retail price of rice, and some retail stores sold polished rice at a price of almost twice that of the previous year. For example, Niigata Koshihikari was sold at 9,000–9,800 yen/10 kg in some of the rice stores in Tokyo and Chiba⁷⁾. In the Keihanshin district, the retail prices of free-market rice reached 9,000–12,000 yen/10 kg too⁸⁾.

On the other hand, rice prices fell when there was a good harvest of rice and domestic rice stocks were enough. For example, the retail prices of main brand rice fell by 23–27% on average from January in 2004 to January in 2005 because the supply of rice exceeded the demand. In addition, discount rice (for example Niigata Koshihikari sold at 4,000 yen or less per 10 kg) was often sold to attract customers in supermarkets.

Thus, there is a possibility that rice prices will change dramatically in the future because of the fluctuation of supply and demand or the deregulation of the rice distribution system after the 1990's. Moreover, if the voluntary rice production adjustment is implemented, such a tendency will become more remarkable. Therefore, the questionnaire asked about consumer purchasing behavior under the situation that rice prices would change dramatically.

(1) Consumer Purchasing Behaviors When Rice Prices Change

In order to analyze consumer reaction when rice prices would nearly be doubled, the respondents were asked to select one from the following alternatives (Types A-D); .

Type A : will not change the purchased quantity and

Table 4 Consumer Purchasing Behaviors When Rice Prices Change

				When Rice Prices Would Nearly Be Doubled				Total	
				Will Not Change the Purchased Quantity		Will Reduce the Purchased Quantity			
				Purchase the Same Brand of Rice	Purchase a Lower-priced Brand of Rice	Purchase the Same Brand of Rice	Purchase a Lower-price Brand of Rice		
				Type A	Type B	Type C	Type D		
When Rice Prices Would Drop to About Half	Will Not Change the Purchased Quantity	Purchase the Same Brand of Rice	Type E	①48	②122	⑤34	⑩37	241 52.3%	
		Purchase a Higher-priced Brand of Rice	Type F	④12	③107	⑧14	⑪39	172 37.3%	
	Will Increase the Purchased Quantity	Purchase the Same Brand of Rice	Type G	⑦1	⑨9	⑥5	⑫15	30 6.5%	
		Purchase a Higher-priced Brand of Rice	Type H	⑯1	⑮4	⑭4	⑬9	18 3.9%	
	Total				62 13.4%	242 52.5%	57 12.4%	100 21.7%	461 100.0%

Note: 1) ①—⑯ are the group numbers.

2) The figures in the table are the numbers of households.

purchase the same brand of rice.

Type B : will not change the purchased quantity and purchase a lower-priced brand of rice.

Type C : will reduce the purchased quantity and purchase the same brand of rice.

Type D : will reduce the purchased quantity and purchase a lower-priced brand of rice.

Others : except Types A-D.

Furthermore, in order to analyze consumer reaction when rice prices would drop to about half, the respondents were asked to select one from the following alternatives (Types E-H) ;

Type E : will not change the purchased quantity and purchase the same brand of rice.

Type F : will not change the purchased quantity and purchase a higher-priced brand of rice.

Type G : will increase the purchased quantity and purchase the same brand of rice.

Type H : will increase the purchased quantity and purchase a higher-priced brand of rice.

Others : except Types E-H.

Next, respondent households were divided into 16 groups (①—⑯ in Table 4) by combination of above-mentioned Types A-H. According to Table 4, 65.9%

(13.4+52.5) of the households would not intend to change the purchased quantity of rice even if rice prices would be doubled while 34.1% (12.4+21.7) of the households intended to reduce the purchased quantity of rice. On the other hand, 89.6% (52.3+37.3) of the households would not intend to change the purchased quantity of rice when rice prices would drop to about half, whereas 10.4% (6.5+3.9) of the households would increase the purchased quantity of rice. Thus, even if rice prices would change dramatically, there will be many households which would not change the quantity of rice. However, it should be noted that there were considerably many households which would adjust the expense for rice by changing the brand of rice.

These 16 groups in Table 4 can be divided into the following four types.

Type 1 (change nothing) : households which would neither change the purchased quantity nor the brand of rice (48 households of ① in Table 4)

Type 2 (change only brand) : households which would not change the purchased quantity but change the brand of rice (241 households of ②—④ in Table 4)

Table 5 Estimated Annual Quantity of Rice Purchased When Rice Prices Change

Type of Purchasing Behaviors	Intention of Purchasing Rice When Rice Prices Change	(1)Numbers of Households	(2)Quantity of Rice Which Was Purchased (kg/month)	(3)Quantity of Purchased Rice of Whole Households in 2005(t/year)	(4)Quantity of Purchased Rice When Rice Prices Would Be Doubled (t)	(5)Quantity of Purchased Rice When Rice Prices Would Drop to Half (t)
Type 1	Change Nothing (① in Table 4)	48	10.1	5.82	5.82	5.82
Type 2	Change Only Brand (②—④ in Table 4)	241	9.6	27.77	27.77	27.77
Type 3	Change Only Quantity (⑤—⑦ in Table 4)	40	10.0	4.81	3.52	5.11
Type 4	Change Quantity and Brand (⑧—⑯ in Table 4)	132	9.1	14.44	10.33	15.88
Total		461		52.84	47.44	54.58

Type 3 (change only quantity): households which would change the purchased quantity but not the brand of rice (40 households of ⑤–⑦ in Table 4)

Type 4 (change quantity and brand): households which would change the purchased quantity and the brand of rice (132 households of ⑧–⑯ in Table 4)

The rate of Type 1 (the rate of households belonging to Type 1) is 10.4% of the total; Type 2 is 52.3%; Type 3 is 8.7%; and Type 4 is 28.6%.

Then how would the amount of purchased rice increase or decrease when rice prices would change? The questionnaire asked respondents about the current quantity of rice purchased in the previous year and the rate of reduction/increase in rice consumption when rice prices would change. The total annual quantity of rice purchased when rice prices would change was calculated from these figures. These results are shown in Table 5.

Type 1 (change nothing) and Type 2 (change only brand) would not change the purchased quantity even if the rice prices would change. On the other hand, Type 3 (change only quantity) and Type 4 (change quantity and brand) would decrease by 1.3 tons a year (26.8%) and by 4.1 tons (28.5%) respectively when the rice prices would nearly be doubled. Furthermore, Type 3 and Type 4 would increase by 0.3 tons a year (6.2%) and 1.4 tons (10.0%) respectively when rice prices would drop to about half. Therefore, as a whole, the quantity of annual purchased rice would decrease to 47.4 tons (89.8%) from 52.8 tons (100%) when rice prices

would nearly be doubled. On the other hand, the quantity of annual purchased rice would increase to 54.6 tons (103.3%) from 52.8 tons (100%) when rice prices would drop to about half.

Thus, it is certain from this analysis that the price elasticity of the demand for rice is considerably inelastic. Especially it must be noted that the quantity of the purchased rice would barely increase even if rice prices would fall dramatically. On the other hand, it is noticeable that half of households would not change the purchased quantity but would change the brand of rice when rice prices would change.

(2) Characteristics of the Purchase and Consumption of Rice in Type 1-Type 4

Table 6 shows the actual situation of the purchase and consumption of rice in Type 1-Type 4. The average purchasing price of rice per 10 kg was the highest in Type 1 (change nothing), followed by Type 3 (change only quantity), Type 2 (change only brand), and Type 4 (change quantity and brand). In Type 1 (change nothing), the rate of households that had purchased Niigata Koshihikari (the most delicious rice) was 18% and the rate of households that had purchased expensive good-tasting rice was higher than the other three types. On the other hand, the rate of households that had purchased Niigata Koshihikari was 6.8% in Type 4 and lower than the other three types. It is obvious that there were many households purchasing expensive good-tasting rice in Type 1 which would neither change quantity nor brand of rice even when rice prices would change dramatically, and there were

Table 6 Characteristics of Type 1-Type 4

Type of Purchasing Behaviors	Characteristics of Purchased Rice		Purchasing Places of Rice			Characteristics of Rice Consumption	
	Average Purchase Price of Polished Rice (yen/10kg)	The Rate of Households That Have Purchased Niigata Koshihikari (%)	The First Place (Rate of Households %)	The Second Place (Rate of Households %)	The Third Place (Rate of Households %)	The Rate of Households Consuming Cooked Rice (%)	The Rate of Households Which Cook Rice Every Time They Eat(%)
Type1	4,356	18.8	Farmer 32.4	Supermarket 28.7	Consumer Cooperative 9.1	20.8	50.0
Type2	3,838	7.9	Supermarket 47.8	Consumer Cooperative 11.6	Farmer 8.4	22.0	51.9
Type3	4,058	5.0	Farmer 32.4	Supermarket 29.7	Consumer Cooperative 20.0	35.0	32.5
Type4	3,749	6.8	Supermarket 47.8	Farmer 12.0	Rice Shop 10.8	31.1	35.6

many households purchasing inexpensive rice in Type 4 which would change quantity and brand of rice.

Type 1-Type 4 purchased rice from different places too. In the case of Type 1 (change nothing) and Type 3 (change only quantity), the first purchasing place of rice was farmers, followed by supermarkets and consumers' cooperatives. On the other hand, in the case of Type 2 (change only brand) and Type 4 (change quantity and brand), the first purchasing place was supermarkets. The rate of farmers and consumers' cooperatives were higher in Type 1 and Type 3 which would not change brand of rice when rice prices would change.

Furthermore, Type 1-Type 4 differed in rice consumption. As for the rates of households which had consumed cooked rice (for example retort-pouch rice) during one month before the date of the survey, Type 1 (change nothing) and Type 2 (change only brand) accounted for 20.8%, 22.0% respectively. On the other hand, Type 3 (change only quantity) and Type 4 (change quantity and brand) were 35.0%, 31.1% respectively, higher than Type 1 and Type 2. In Type 1 and Type 2, the rates of the households which cooked rice every time they ate were 50.0% and 51.9% respectively. On the other hand, the rates of Type 3 and Type 4 were 32.5% and 35.6% respectively, lower than Type 1 and Type 2. Many households in Type 3 and Type 4 cooked rice in large quantities at a time and warmed it up with a microwave oven if necessary. Thus, the style of rice consumption in Type 1 and Type 2 which would not change the quantity of rice obviously differed from that in Type 3 and Type 4 which would change the quantity of rice according to the price changes.

(3) Factors Affecting Consumer Rice-Purchasing Behavior

In this section, factors affecting the rice-purchasing behaviors in Type 1-Type 4 are examined using the method of quantification type II (a multiple discriminant analysis with dummy variables). Seven factors considered in the preceding section seemed to be related to the rice-purchasing behaviors of consumers in Type 1-Type 4 too. However, the quantity of purchased rice must be excluded from explanatory variables (items) in the method of quantification type II because it is used as division index of Type 1-Type 4. Therefore, the following six factors were selected as explanatory variables (items): (1) household gross income, (2) family size, (3) points of interest when purchasing rice, (4) occupation of purchaser, (5) age of purchaser, and (6) residence area of purchaser.

First, discrimination of Type 1-Type 4 using above-mentioned six variables was tried by applying the method of quantification type II. As a result of this, it became clear that the discrimination of Type 2 and Type 4 was difficult because the figures of six variables in both groups were similar. Therefore, Type 2 · 4 was made by integrating Type 2 and Type 4, and the discriminant analysis of three groups (Type 1, Type 2 · 4, and Type 3) was tried. Table 7 shows the result of the analysis. The correlation ratios of the first axis and the second axis are 0.158 and 0.069 respectively. The hit rate of discriminant is 61.6 percent. Though the correlation ratios and the hit ratio of discriminant are not so high, the differences among Type 1, Type 2 · 4, and Type 3 can be explained to some extent by the items (variables) shown in Table 7.

Figure 1 shows the centroids (the center of gravity) of Type 1, Type 2 · 4, and Type 3. The horizontal axis

Table 7 Discrimination between Type1-Type4 (Result of the Method of Quantification Type II)

Item	Category	The First Axis		The Second Axis	
		Score	Range	Score	Range
Item1:Household Gross Income	≤400(ten thousand yen)	0.027		-0.701	
	400—800	-0.239	1.080	-0.114	4.213
	800—1200	0.429	<0.119>	0.266	<0.203>
	1200—1600	0.106		2.273	
	≥1600	0.841		3.512	
Item2:Family Size	≤2	0.149		0.466	
	3	-0.067	0.603	0.376	1.273
	4	-0.278	<0.090>	-0.500	<0.135>
	≥5	0.325		-0.807	
Item3:Points of Interest When Purchasing Rice	Price	-0.627		0.708	
	Safety	0.767	1.394	-1.083	1.791
	Taste and Variety	0.359	<0.206>	-0.233	<0.153>
	Others (Nutrition, Wash-free Rice)	-0.008		-0.317	
Item4:Occupation	Full-time Housewife	0.125		0.129	
	Part-timer	-0.124	0.515	0.117	0.498
	Office Worker or Self-employed	-0.009	<0.060>	-0.369	<0.059>
	Others (public employee or specialist)	-0.390		0.172	
Item5:Age	≤29	-0.364		-0.442	
	30—39	-0.292	1.827	0.056	0.748
	40—49	0.162	<0.212>	0.113	<0.061>
	50≤	1.463		0.306	
Item6:Residence Area	There is paddy field in the neighborhood	0.246	0.436	-0.089	0.158
	There is no paddy field in the neighborhood	-0.190	<0.093>	0.069	<0.021>
Correlation Ratio		0.158		0.069	
Centroid	Type1	0.944		0.453	
	Type2·4	-0.190		0.021	
	Type3	0.643		-0.739	
The Hit Rate of Discriminant (%)		61.6			

Note: The figures in < > are partial correlation coefficients.

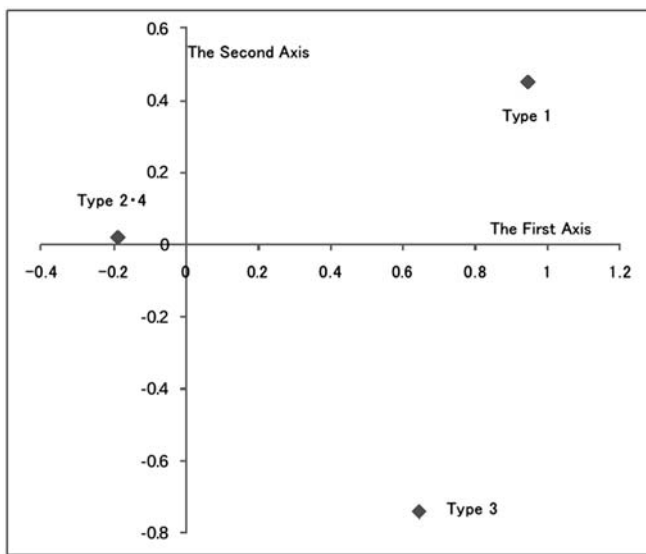


Fig. 1 The Centroids of Type 1-Type 4
Note : Based on data in Table 7.

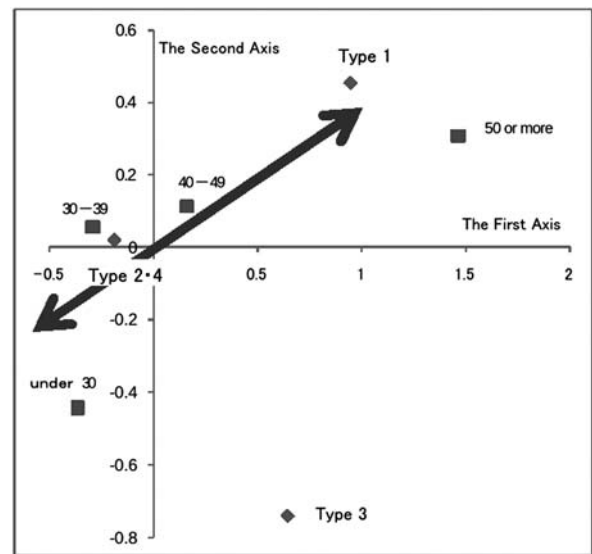


Fig. 2 Relationship between the Age of Purchaser and Type 1-Type 4
Note : Based on data in Table 7.

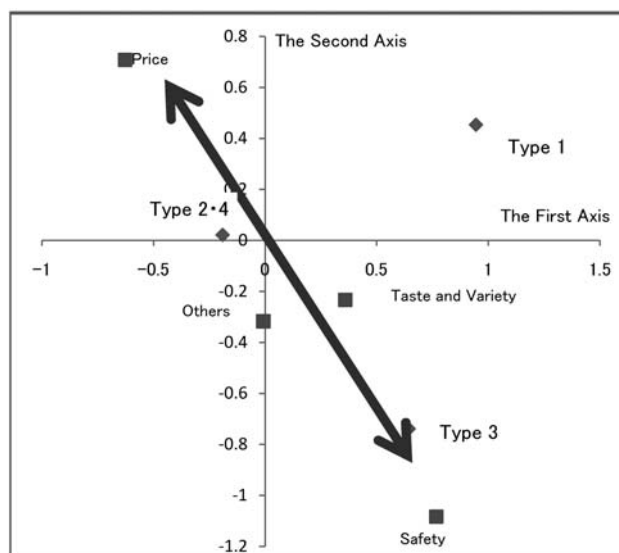


Fig. 3 Relationship between the Important Items Considered and Type 1-Type 4
Note : Based on data in Table 7.

is the first axis gained from the method of quantification type II and the vertical axis is the second axis. The centroid of Type 1 lies in the first quadrant ; Type 2 · 4 lies in the second quadrant ; and Type 3 lies in the fourth quadrant.

Then, how do the six items (variables) in Table 7 affect Type 1, Type 2 · 4, and Type 3 ?

Figure 2 shows the relationship of item 5 (age of the purchaser) and Type 1-Type 4. According to this, the higher the age of the purchaser, its scores of the first axis and the second axis become higher toward the first quadrant direction. This suggests that if the age of the purchaser is high, there is a higher possibility of belonging to Type 1 rather than Type 2 · 4 or Type 3.

Figure 3 shows the relationship of item 3 (points of interest when purchasing rice) and Type 1-Type 4. According to this, rice price (one of the categories of item 3) is located in the second quadrant. In contrast, safety or taste is located in the fourth quadrant. This means that households which were concerned with rice prices tended to belong to Type 2 · 4 and households concerned with safety of rice belonged to Type 3.

By checking relationships of other items in Table 7 and Type 1-Type 4 in the same way, the following points can be confirmed. If households earned a high income, the possibility of belonging to Type 1 would increase. Households with one or two members tended to belong to Type 1, and households with three or four belonged to Type 2 · 4. As for occupation of purchaser, full-time housewife was likely to belong to Type 1, and part-timer tended to belong to Type 2 · 4. If a household was located far from rice field area, the possibility

of belonging to Type 2 · 4 would increase.

From this analysis, it is suggested that (1) household gross income, (2) family size, (3) points of interest when purchasing rice, (4) occupation, (5) age, and (6) residence area were the causes of different purchasing behaviors of Type 1-Type 4.

5. Conclusion

This paper has analyzed rice-purchasing behaviors and clarified the factors affecting it through a questionnaire survey of 461 consumers in Japan. The results obtained from the analysis are as follows.

First, consumers' selection of rice was affected not only by the economic factors which influenced the consumption expenses per capita such as household gross income, family size, and quantity of purchased rice but also by the occupations of purchaser and the points of interest when purchasing rice. It is especially important to have found out how much expenditure increases by each point of interest when purchasing rice.

Second, consumer purchasing behaviors with rice price changes could be classified into four types : Type 1 (households which would neither change the quantity nor the brand of rice) ; Type 2 (households which would not change the quantity but the brand of rice) ; Type 3 (households which would change the quantity but not the brand of rice) ; and Type 4 (households which would change the quantity and the brand of rice). According to the questionnaire survey, Type 1 constituted 10.4% of the total ; Type 2, 52.3% ; Type 3, 8.7% ; and Type 4, 28.6%.

Third, it should be noted that the quantity of purchased rice would barely increase even if rice prices would fall dramatically. On the other hand, it is noticeable that half of households would not change the purchased quantity of rice but would change the brand with rice price changes.

Fourth, (1) household gross income, (2) family size, (3) points of interest when purchasing rice, (4) occupation, (5) age, and (6) residence area were the causes of different purchasing behaviors of Type 1-Type 4.

Based on the above findings, farmers and agricultural cooperatives should consider the following points for the production and sale of domestic rice in the future.

First, farmers and agricultural cooperatives have to recognize the difference of the purchasing behavior of Type 1-Type 4 and build their production and sales strategies by specifying target consumers through segmentation of the rice market. It is important to increase the households like Type 1 which would not change the purchased quantity or brand of rice even if rice prices would rise. So it is necessary for farmers and agricultural cooperatives not only to supply good-tasting rice but information on safety, quality, and taste.

Second, though it is necessary for farmers and agricultural cooperatives to reduce the rice production costs, they should avoid price competition. They should

build a differentiation strategy in order to realize high value addition and improve the taste and quality of rice. Even if rice prices would fall, an increase in the overall demand for rice can barely be expected. Therefore, it is important to establish a differentiation strategy.

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米価と消費者の米購買行動

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要約：本稿では、461 人の消費者を対象としたアンケート調査に基づき、我が国の消費者の米購買行動に関する分析を行った。さまざまな価格帯の米の中から消費者が購入する米を決定する際に作用する要因を重回帰モデルによって検討するとともに、米価が変動した場合の購買行動を類型化し、数量化Ⅱ類の手法を用いて類型間に差異をもたらしている要因を明らかにした。分析から得られた知見を整理すると、次のとおりである。第 1 に、米の選択に際しては、世帯総所得、世帯員数、米購入量といった 1 人当たり消費支出額を規定する経済的要因に加え、米購入時の関心項目や購入者の職業といった要因が影響していた。第 2 に、米価が変動した場合の購買行動は、米の購入量やブランドを変えない意向の世帯（タイプ 1）、米の購入量を変えずにブランドを変える世帯（タイプ 2）、米の購入量を変えブランドは変えない世帯（タイプ 3）、米の購入量やブランドをともに変える世帯（タイプ 4）に区分でき、調査した総世帯に占めるそれぞれの構成割合は 10.4%、52.3%、8.7%、28.6% となっていた。第 3 に、米価が大幅に下落しても、米の購入量が増える見込みはきわめて小さい。第 4 に、タイプ 1～タイプ 4 の購買行動の違いには、世帯総所得、世帯員数、米購入時の関心項目、購入者の年齢、職業、居住地域の 6 要因が影響していた。

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