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# Consumer preferences for rice in France : an analysis based on attitudes and sensory criteria

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## Abstract

The program of research on consumers perceptions of the quality of rice aims at a better understanding of consumers behaviours. This study examines how preferences of a French consumer for rice are related both to the product's and the person's characteristics.

The first objective of the study is to examine one set of product specific variables such as perceptions of rice in general, consumers characteristics concerning brand importance, choice criteria and purchase habits, and one set of person specific variables - food-related consumers' profiles in terms of variety seeking, involvement in cooking,.. -, and other individual factors. Results show that on the one hand, respondents exhibit both positive perceptions of rice, and high levels of satisfaction, involvement in cooking and variety-seeking, but that, on the other hand, those two types of variables are not closely related.

The second part of this research aims to study consumer preferences for different types of rice, and to test the relations between these preferences and the two sets of variables presented above - consumers attitudes, food-related profiles and other individual factors.

An experiment has been designed in order to obtain a sensorial evaluation of 6 different cooked types of rice, graded from 1 to 10, in blind conditions, from 80 consumers. Then, 150 respondents, including the 80 from the tasting experiment, were asked to give answers to a large set of questions about rice, such as differences in brand images, product quality, benefits and problems associated with rice. Furthermore, respondents gave their opinion about general items in connection with food-related consumers' profiles. After factor analysis, the different sets of items were combined to form a small set of summary variables related to consumers' preferences. Lastly, a cluster analysis conducted on the basis of consumers' preferences led to differentiate and describe 4 groups of consumers.

### Keywords

- Consumer preference, attitudes, choice criteria
- France

## Introduction

This report presents the findings of a quantitative study which forms the second stage of a programme of research on consumption of rice carried out on behalf of the European Economic Community (Concerted Action EC-DG-VI). First, a qualitative study has been conducted, using the focus group techniques and an experimental test of 4 to 7 rices according to the countries. The objectives of the focus groups were twofold :

- Collect extensive information about rice consumption : experience and knowledge of product, attitudes about rice products and brands, ways of cooking, situations of usage, etc.
- Collect sensory data in relation to rice preference, based on blind tests of the different rices : words used to describe aspect, odours, taste; association of rice and eating situations; preferences.

On the basis of the results of the qualitative research, a quantitative study has been conducted in European countries. Results presented in this paper only deal with the French study.

The first objective of this study is to examine consumers perceptions of rice in general, consumers characteristics concerning brand importance, choice criteria and purchase habits, food-related consumers' profiles in terms of variety seeking, involvement in cooking, and other individual factors.

In the second part of this report, consumers' preferences for 6 different types of rice based on sensorial criteria are related both to the product itself, and to consumers' characteristics previously studied, such as perceptions of rice, choices and consumers' profiles.

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## Consumers and Rice

### Methodology

This first part of the study was designed to shed light on general perceptions of rice. 153 consumers –102 women and 51 men - were interviewed. Respondents were asked to give answers to a large set of questions about rice, such as benefits and problems associated with rice, choice of rice and satisfaction related to rice consumption, brand importance and choice criteria. After that, respondents answered a number of background questions on purchase habits, cooking frequency, demographics, etc.

### Consumers perceptions of rice

## Association of rice with descriptors

First, respondents had to rate rice in general on a list of descriptors. A principal components analysis was conducted for this set of items. All items load on 6 common underlying factors. For the first three factors, combining these items into scales yielded high Cronbach's alphas. These items were thus combined into sum scores. Table 1 shows the factor analysis results, with, for each factor, the mean value and number of descriptors.

Table 1 : Association of rice with descriptors

Table 1 : Association of rice with descriptors			
	Items	mean value (from 1 to 10)	Number of descriptors
Dimension 1 Convenience	Long shelf life / Goes a long way / Always handy / Very useful	8.7	4
Dimension 2 Negative aspects	Sticky / Fluffy / Soggy / Boring by itself / Sticks to the bottom of the sauce pan	3.7	5
Dimension 3 Taste	Creates variety / Healthy / Filling / Tasty	7.83	5
Dimension 4	Can be used to create a snack / Easy to cook	7.5 and 7.7	2
Dimension 5	Leftovers can be used / Children like it	7.6 and 7.9	2
Dimension 6	Can cause dangerous food poisoning	1.8	1

Results presented above show that the convenience factor is dominant (scale of 1 to 10 : mean value of 8.7\*\*). Rice is first appreciated because it is useful, always handy and goes a long way. This first convenience aspect is completed with cooking convenience : rice is also valued because it is easy and ready to cook. The last descriptor related to convenience deals with the fact that leftovers can be used. Here again, respondents strongly associate this descriptor with rice.

*\*\*Respondents were asked to rate rice in general on each of the descriptions, using a scale of 1 to 10 where 1 indicates that the statement is not associated with rice and 10 indicates that the statement is associated strongly with rice*

Mean value for taste and health is important, too (mean value of 7.8) : rice is mainly valued because it is tasty, healthy, represents a variation in the fare, and can be prepared in many different ways. Moreover, children do like it (mean value of 7.9).

Rice is not perceived as dangerous (mean value of 1.8), and negative aspects are not very important (mean of 3.7).

## Choice of rice and satisfaction related to rice consumption

Respondents were also asked to indicate their agreement with a list of general statements related to the choice of rice and their satisfaction concerning rice consumption.

In order to make a good choice about rice, respondents think one must have confidence in the brand or the producer (mean value of 3.6\*\*), be well informed about the different types of rice (mean value of 4.0), but

confidence in the retailer (shop) selling it is not perceived as important (mean value of 2.8).

*\*\*Respondents were asked to indicate their agreement with each of the statements, using a scale of 1 to 5 where 1 indicates that they strongly disagree, and 5 indicates that they strongly agree*

To most respondents, rice is not something they consider superfluous (scale of 1 to 5 : mean value of 4.3). Moreover, respondents' satisfaction concerning rice consumption is high. Three statements were related to satisfaction dealing with rice consumption. A factor analysis conducted on the basis of the results led to one factor, and a sum "satisfaction" variable was created. The mean value of 3.75 for this variable reveals a rather high level of satisfaction.

## Brand importance

General results related to brand importance confirm previous data : respondents exhibit high brand proneness and loyalty.

Respondents usually buy the same brand (scale of 1 to 5 : mean value of 3.7). As for the reasons for brand loyalty, consumers mainly evoke the quality of the products associated with the brand (mean value of 3.7). They feel there are differences between brands (mean value of 4.2), and will not change only because there is a reduction in the price of another brand (mean value of 4.1).

A factor analysis conducted on the basis of these 4 items led to one factor, and these items were thus combined into a sum score for "Brand importance" ; the mean value of 3.95 for this variable reveals a high level of brand importance.

Results exhibit a strong relation between perceived differences among brands, confidence in the brand on the one hand, and brand importance on the other hand (correlation coefficients of respectively 0.33 and 0.34).

Whereas results yielded to high brand importance, respondents do not pay much attention to the store. For more than half of respondents, all shops are the same, anyway (scale of 1 to 5 : mean value of 3.2). Respondents do not have a specific store where they purchase rice (mean value of 2.1). They just go to the shop they are familiar with (mean of 3.4), generally because of its proximity (mean 3.9).

## Consumption situations and choice criteria

In order to know if consumption situation influences choice criteria, we asked respondents to consider two consumption situations – a main meal at home, and a special meal - and indicate for each situation the 3 most important criteria for choosing a type of rice.

Several general results deserve attention. First, whatever the situation, the criteria most often indicated as first criteria for choosing a type of rice are its smell, its brand, and its country of origin. Second, some criteria, which are not indicated as the most important, often appear as second most important or third most important : price, look, and cooking time. Last, some criteria do not appear as important : familiar shop and pre-cooked rice.

Concerning the comparison between the two situations, there is not any important difference in ranking between the two consumption situations. However, for the most important criteria, smell is more frequently indicated for a special meal than for a main meal, and price is more frequently indicated for a main meal than for a special meal. With regard to the 3 most important criteria, smell, look and country of origin are more frequently indicated for a special meal than for a main meal, and price and cooking time are more frequently indicated for a main meal than for a special meal. There is no difference for the brand criteria.

Table 2 : Choice criteria and consumption situations

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	Familiar shop	Brand	Country of origin	Price	Cooking time	Looks	Smell	Pre-cooked
	Percent ranking first							
Main meal at home	3.9	14.8	12.3	11.6	5.2	7.1	21.9	0.6
Special meal	1.9	14.2	12.9	3.2	1.9	8.4	32.3	0.6
	Percent ranking second or third							
Main meal at home	7.1	16.8	16.1	35.5	30.3	25.8	23.2	3.2
Special meal	7.7	17.4	20.6	25.8	20.6	34.2	24.5	4.5
	Percent ranking first, second or third							
Main meal at home	11	31.6	28.4	47.1	35.5	32.9	45.2	3.9
Special meal	9.7	31.6	33.5	29	22.6	42.6	56.8	5.2

### Perceptions of rice and socio-demographic characteristics

An analysis of variance was conducted in order to provide information on the influence of socio-demographic characteristics on perceptions of rice.

Table 3 : perceptions of rice and socio-demographic characteristics

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Consumers' socio-demographic profiles	Sex	Age	Cooking frequency	Profession	Income
Perceptions of rice					
Convenience (Long shelf life / Goes a long way / Always handy / Useful)	*				
Negative aspects (Sticky / Fluffy / Soggy / Boring by itself / Sticks)	*	*	*		*
Taste, health (Creates variety / Healthy / Filling / Tasty)	*			*	
Brand importance	*				
Satisfaction		*			

\* Only relations with significant F appear.

Sex is the characteristic that yields the highest number of differences.

For women, brand is more important than for men (mean values of 4.1 and 3.6 respectively). They also find rice more convenient than men do (mean values of 8.9 and 8.2 respectively). They give a higher note for taste aspect (mean values of 8 and 7.3 respectively), and more strongly disagree with the propositions concerning negative aspects (mean values of 3.3 for women and 4.3 for men).

Age influences notes given to two variables : satisfaction and negative aspects.

As for satisfaction, three groups appear : level is the lowest for 18-24 years old respondents, with a mean value of 3.3, it is a little higher – mean value of 3.9 - for the three middle groups (from 25 to 60 years old), and really high for the oldest group, with a mean value of 4.2.

The influence of age on negative aspects perception is not linear. Whereas for the youngest group, the mean value is the highest (4.4), the second group, on the contrary, find few negative aspects (mean value of 2.96). The three oldest groups give the same mean value of 3.4.

Cooking frequency was self-reported by respondents. 102 respondents do the cooking most of the time, 48 do it sometimes, and only 5 declared they never do the cooking. Cooking frequency influences negative aspects perception : respondents who do the cooking less frequently perceive more negative aspects (mean value of 4.1) than those who do it most of the time (mean value of 3.4).

The influence of income on negative aspects perception is not linear. Respondents whose income is the lowest perceive the most negative aspects (mean value of 4.3), then this perception decreases with higher income (values of 3.5 and 3.0 for the next two groups), but for the highest income group, it increases again (mean value of 3.8).

The influence of profession on notes given to taste characteristics is interesting. In group 2, which reassembles workers, the mean value (8.4) is significantly higher than in the three other groups of white collars, students or retired persons (same mean value of 7.5).

Family size does not influence rice image.

## Food-related consumers' profiles

### Food-related consumers' profiles : general results

In order to know if consumers' profiles in terms of relations to food and cooking influence their attitude towards rice, respondents were asked to give their opinion about general items in connection with innovativeness (interest in new food products), variety seeking in food domain, involvement in cooking,... These items are part of a range of items operationalizing the components of the Person-Object Relationship, previously developed and tested in other domains by Evrard and Aurier (Evrard and Aurier, 1996). Again, they had to indicate their agreement with a list of general statements, using a scale of 1 to 5 where 1 indicates that they strongly disagree, and 5 indicates that they strongly agree. After factor analysis, the different sets of items were combined to form a small set of summary variables related to consumers' preferences.

Table 4 : Food-related consumers' profile



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	Interpretation	Mean value	Standard deviation	% from 1 to 3	Number of items
Dim1- INV	Involvement in cooking	3.77	0.94	22.6	6
Dim2- VS	Variety-seeking in the food domain	4.02	0.74	12.1	7
Dim3- NFP	Interest in new food products	3.19	0.81	43.8	4
Dim4- FOR	Stimulation (Tendency to forget everything while cooking)	2.82	0.99	65.6	3
Dim5- EXP	Cooking subjective expertise	3.11	0.99	39.5	5

Data analysis reveals a high level for variety-seeking in the food domain (mean value of 4.0), but in the meantime, consumers are not really interested in new food products (mean value of 3.2).

Involvement in cooking is generally high (mean value of 3.8). However, respondents do not like cooking to the point of forgetting everything while cooking (mean value of 2.8). Moreover, whereas they like cooking, consumers do not perceive themselves as high cooking experts.

### Food-related consumers' profiles and socio-demographic profiles

An analysis of variance was conducted in order to provide information on the influence of socio-demographic characteristics on food-related profiles.

Table 5 : Food-related consumers' profiles and socio-demographic characteristics

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Socio-demographic profiles	Sex	Age	Family	Cooking frequency	Profession
Food-related profiles					
Involvement in cooking		*		*	
Variety-seeking in the food domain					*
Interest in new food products					*
Cooking subjective expertise	*		*	*	

\* Only relations with significant F appear.

Sex only shows influence on cooking subjective expertise : women perceive themselves as higher cooking experts than male consumers do (mean values of 3.22 and 2.89 respectively).

Age influences involvement in cooking, but this influence is not linear. Whereas for the youngest group, the mean value is close to the average (3.8), the second group is the most involved group (mean value of 4.16). The three oldest groups give mean values from 3.5 to 3.77.

Family size influences cooking subjective expertise, but again this influence is not linear. Respondents who live alone do not perceive themselves as experts (lowest mean value of 2.5), whereas respondents in families of 4 or 5 persons give the highest notes (3.4 and 3.5).

Cooking frequency logically is positively related to involvement in cooking and cooking subjective expertise. Respondents who never do the cooking, or who only do the cooking sometimes are less involved (mean values of 3.1 and 3.5) than those who do it most of the time (mean value of 3.9). Moreover, respondents who never do the cooking, or who only do the cooking sometimes do not perceive themselves as experts (mean values of 1.8 and 2.8), whereas those who do it most of the time are aware of their subjective expertise (mean value of 3.3)

The influence of profession on variety – seeking and on interest in new food products is interesting. For these two characteristics, results are similar. In groups 2 (workers) and 4 (retired persons), levels of variety – seeking (same mean value of 3.7), and interest in new food products (same mean value of 2.9) are low, whereas the two other groups of students and white collars exhibit significantly higher levels of variety – seeking (same mean value of 4.2) and interest in new food products (same mean value of 3.4).

Income does not show any influence of food-related profile. Besides, no socio-demographic variable appeared related to the tendency to forget everything while cooking.

## Food-related consumers' profiles and perceptions of rice

In order to know if consumers' profiles influence their perceptions of rice, correlation between notes on consumers' profiles, and notes given to descriptors associated with rice has been examined. Table 6 reveals few significant correlation coefficients.

Table 6 : Food-related consumers' profiles and rice image

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Consumers' profiles Rice descriptors	Satisfaction	Involvement in cooking	Variety- seeking	Cooking subjective expertise
Convenience (Long shelf life / Goes a long way / Always handy / Useful)			0.25	
Negative aspects (Sticky / Fluffy / Soggy / Boring by itself / Sticks)	-0.34			
Taste, health (Creates variety / Healthy / Filling / Tasty)	0.23	0.17		0.26
Can be used to create a snack	0.16			
Easy to cook	0.26			
Children like it	0.18	0.17		0.30
Leftovers can be used	0.17	0.17	0.20	0.23

\* Only significant correlation coefficients appear

Data analysis reveals few significant correlation between food-related consumers' profiles, and descriptors associated with rice. Two food-related factors - Interest in new food products and Forget everything while cooking – do not show any correlation with rice descriptors. Moreover, food-related consumers' profiles do not appear significantly correlated to brand importance.

However, several relations deserve attention. Satisfaction is logically positively correlated to most positive descriptors of rice, and negatively correlated to negative aspects of rice. Involvement in cooking and cooking



subjective expertise are correlated to the same three positive descriptors of rice : taste, fact that children like it and leftovers can be used. Variety-seeking is associated with practical aspects (convenience sum variable and fact that leftovers can be used).

## Conclusion

The first part of this study deals with one set of product specific variables – perceptions of rice in general, and one set of person specific variables - food-related consumers' profiles. Results show that on the one hand, respondents exhibit both positive perceptions of rice, and high levels of satisfaction, involvement in cooking and variety-seeking, but that, on the other hand, those two types of variables are not closely related.

The second part of this research aims to study consumer preferences for different types of rice, and to test the relations between these preferences and the two sets of variables presented above.

## Consumer preferences for different types of rice, and explanatory variables

### Consumer preferences for different types of rice

#### Methodology

An experiment has been designed in order to obtain a sensorial evaluation of 6 different cooked types of rice, graded from 1 (I do not like it at all) to 10 (I really like it), in blind conditions, from 80 consumers.

Then, respondents were asked to evaluate the same uncooked (raw) types of rice, always in blind conditions.

#### Consumer preferences for different types of cooked rice : General results

The analysis of mean values provides three groups of rice varieties : Basmati rice (Group 1), Parboiled rice (Group 2), and Natural rice (Group 3).

- Group 1 : Basmati rice  
Basmati rice is ranked first, with a mean value of 7.24, and more than half the respondents who gave a note superior to 8.
- Group 2 : Parboiled rice  
In the second group, we find parboiled types of rice, with mean values from 4.9 to 5.8, and less than 60 % of respondents who gave a note from 1 to 5.
- Group 3 : Natural rice  
In the third group, which corresponds to natural types of rice, values are the lowest (3.8 and 4.7), and more than 60 % of respondents gave a note from 1 to 5.

The analysis of standard deviations provide more information. The results concerning TBCC (Thai Bonnet Camargue Natural) are the most interesting, the standard deviation for TBCC being important. As a consequence, whereas TBCC rice obtains a mean value inferior to UBC (Uncle Ben's Parboiled), more consumers give notes from 8 to 10 to TBCC.

Table 7 : Consumer preferences for different types of cooked rice : General results

Table 7 : Consumer preferences for different types of cooked rice : General results

	Mean value (1 to 10)	Standard deviation	% from 1 to 5	% from 8 to 10
BAC (Basmati Nature Long)	7.24	2.23	19.3	53.0
TBSC (Thai Bonnet Standard Parboiled)	5.83	2.18	45.8	28.9
TBNC (Thai Bonnet Nouveau Parboiled)	5.29	2.24	56.0	21.4
UBC (Uncle Ben's Parboiled)	4.89	2.21	56.6	12.0
TBCC (Thai Bonnet Camargue Natural)	4.73	2.62	60.2	19.1
ARC (Ariete Camargue Natural)	3.78	1.93	80.5	3.7

### Consumer preferences for cooked and raw types of rice

Figure 1 clearly shows four groups of cooked varieties of rice, and their relations with corresponding raw varieties.

Figure 1 : Configuration stimulus dérivé

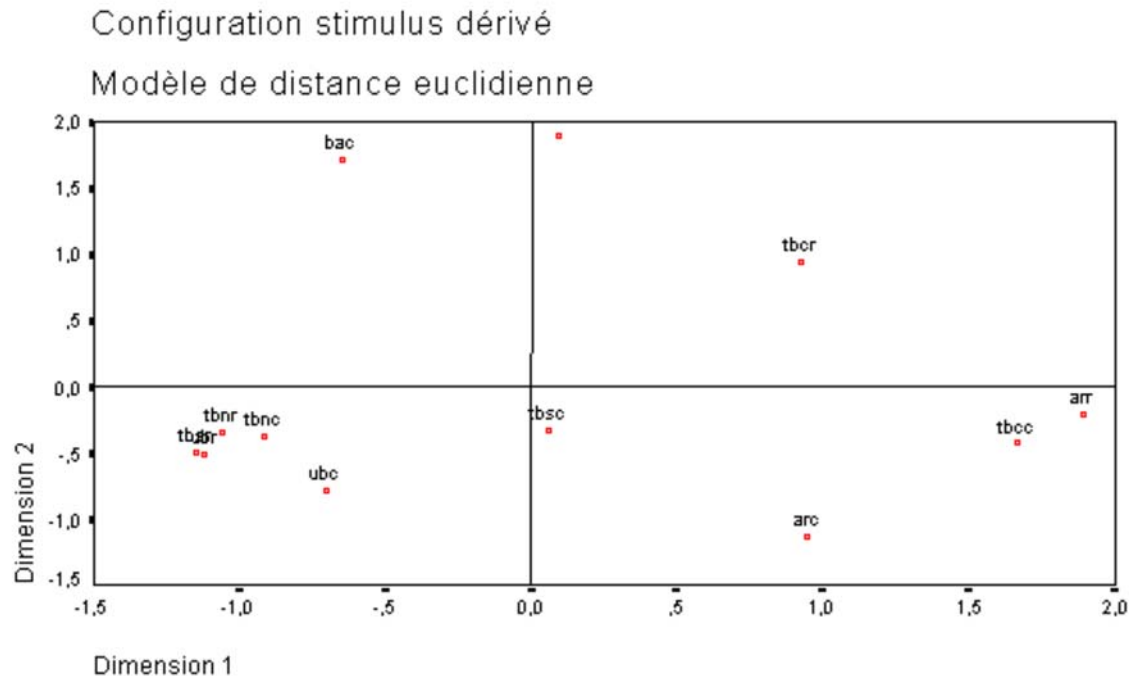


Table 8 : Consumers' preferences for cooked and raw types of rice

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Table 8 : Consumers' preferences for cooked and raw types of rice

	BA		TBS		TBN		UB		TBC		AR	
Cooked rice	C *	R *	C	R	C	R	C	R	C	R	C	R
BAC	-	0.29										
TBSC			-	0.25				0.29	0.33			
TBNC				0.21	-	0.31	0.43		-0.28		-0.30	
UBC				0.36	0.43	0.38	-	0.36	-0.25	-0.24		
TBCC			0.33		-0.28		-0.25		-	0.22		0.36
ARC					-0.30						-	

\* C : Cooked, R : Raw

Results are really interesting : whereas it was a blind test, the relations between cooked and raw types of rice appear really strong. For all varieties of rice, apart from AR, the note given to the cooked rice is significantly correlated to the note given to the raw rice. Raw rice perception thus appears as a good predictor of cooked rice perception. This result confirms previous results obtained with the qualitative study.

Basmati rice value is only correlated to the note given to raw Basmati. This result confirms that it is apart from the other varieties of rice.

Parboiled types of rice (group 2) show strong correlation coefficients with each other. Cooked UB is related to the three parboiled raw types of rice, and to cooked TBN. This last rice is also related to raw TBS. Lastly, cooked TBS is related to raw UB. Moreover, parboiled types of rice are negatively correlated to natural types of rice, with the exception of cooked TBS. Cooked TBN thus appears negatively related to the two cooked natural types of rice, and UB is negatively correlated to raw and cooked TBC.

Within parboiled types of rice however, TBS appears apart from the others. It is both positively correlated with UB and TBN, and positively correlated to cooked TBC, while the two first parboiled types of rice are negatively correlated to natural types of rice.

Natural types of rice are opposed to TBN and UB. However, in this third group, cooked AR only shows a negative relation to cooked TBN, and confirms that it is apart from the other varieties of rice.

## Consumer preferences for different types of rice and perceptions of rice

In order to know if consumers' perceptions of rice influence their preferences, correlation between notes given to the different cooked types of rice, and notes given to descriptors associated with rice, satisfaction and brand importance has been examined. Table 9 reveals few significant correlation coefficients.

Table 9 : Consumers' preferences and perceptions of rice

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Table 9 : Consumers' preferences and perceptions of rice

Correlation coefficients *	Convenience	Negative aspects	Leftovers	Satisfaction	Brand importance
UBC	0.27		0.20	0.22	0.22
TBSC **		0.21	-0.21		-0.21

\* Only significant correlation coefficients appear

\*\* For the other types of rice, no significant correlation appear.

Data analysis reveals few significant correlation between notes given to the different cooked types of rice, and descriptors associated with rice. Uncle Ben's Parboiled rice is associated with convenience, and the fact that leftovers can be used, whereas Thai Bonnet Standard Parboiled is associated to the negative aspects of rice, and negatively correlated to the use of leftovers. The other four varieties of rice do not show any correlation with rice descriptors.

Again, data analysis reveals few significant correlation between notes given to the different cooked types of rice, and perceptions of rice. Uncle Ben's Parboiled rice is the only rice variety associated with satisfaction and brand importance. The other five varieties of rice do not show any correlation with these variables. However, it is interesting to notice that this relation exists only for Uncle Ben's rice, since the test was a blind test, without any references to the brand.

## Consumer preferences and consumers' profiles

### Consumer preferences and food-related consumers' profiles

Two food-related factors - Interest in new food products and variety-seeking – show significant correlation with the notes given to two rice varieties. These relations deserve attention : whereas Thai Bonnet Nouveau Parboiled is positively correlated with these two variables, Thai Bonnet Camargue Natural is negatively correlated to them.

Table 10 : Consumers' preferences and food-related consumers' profiles

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Table 10 : Consumers' preferences and food-related consumers' profiles

Correlation coefficients *	Variety-seeking	Interest for new food products
TBCC (Thai Bonnet Camargue Natural)	-0.28	-0.31
TBNC (Thai Bonnet Nouveau Parboiled) **	0.31	0.23

\* Only significant correlation coefficients appear

\*\* For the other types of rice, no significant correlation appear.

### Consumer preferences and socio-demographic consumers' profiles

Data analysis reveals only one significant correlation between notes given to the different cooked types of rice, and socio-demographic consumers' profiles.

This unique significant correlation deals with TBN note and consumers' profession. In group 2, which reassembles workers, the mean value (3.14) is significantly lower than in the three other groups of students, white collars, or retired persons (mean values of 5.8, 5.6 and 4.7 respectively).

However, even if all other correlation coefficients are not significant, they provide information on the differences between the 6 types of rice.

## Synthesis

Table 11 : Consumer preferences for different types of rice, and correlated variables

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	Note	Significantly correlated variables				
		Cooked rice	Raw rice	Rice descriptors	perceptions of rice	Food-related and socio-demographic profiles
BAC	7.24		BA			
TBSC	5.83	TBC	TBS UB	Negative aspects Leftovers (<0)		
TBN	5.29	TBC (<0) UB AR (<0)	TBN TBS			Variety-seeking Interest in new food products Profession
UB	4.89	TBC (<0) TBN	UB TBN TBS TBC (<0)	Convenience Leftovers	Satisfaction Brand importance	
TBC	4.73	UB (<0) TBN (<0) TBS	TBC AR			Variety-seeking (<0) Interest in new food products (<0)
AR	3.78	TBN (<0)				

\* (<0) : negative correlation

## A cluster analysis of consumers' preferences

Cluster analysis on the basis of the notes given to the 6 cooked types of rice provides four groups (Table 12) :

### Group 1 : Rice lovers

In this group, Basmati rice is ranked first, with a mean value of 8.53, but TBC also obtains a value significantly superior to the mean value, and TBNC is the only rice which obtains a value significantly inferior to the mean value.

The 21 respondents in this group can be described as Rice "lovers", since they give on average, for all types of rice, the highest mean value of 5.99

### Group 2 : Natural types of rice haters

In the second group, we find respondents who appreciate two parboiled types of rice – TBN and Uncle Ben's- and do not like natural varieties of rice (mean value of 2.7 and 2.6 respectively for TBC and AR).

This group is the most important, with 35 respondents (43.75 %)

### Group 3 : Basmati haters

Respondents of the third group are the only consumers who absolutely dislike Basmati rice. Concerning the parboiled types of rice, they are opposed to respondents of group 2, since they do not appreciate TBN and Uncle Ben's. Moreover, they do like TBC rice, which was rejected by group 2 (mean value of 7.7 and 2.7 respectively for groups 3 and 2).

This group reassembles few respondents (only 6 persons), who are the ones who give on average, for all types of rice, the lowest mean value (4.28)

#### Group 4 : Ariete rice lovers

In this last group, respondents resemble first group's consumers. They rank Basmati rice first, with a mean value of 7.4, and do not really appreciate TBN and Uncle Ben's. The difference leads in their perceptions of natural types of rice : whereas first group likes TBC, this last group is the only one that gives AR rice a value significantly higher than the mean value.

Data analysis reveals no significant relation between clusters and food-related or socio-demographic consumers' profiles, or with perceptions of rice.

Table 12 : Cluster analysis, General results

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	Total		Group 1		Group 2		Group 3		Group 4	
Mean Value and Rank	MV	R	MV	R	MV	R	MV	R	MV	R
BAC	7.24	1	8.53	1	7.06	1	2.67	5	7.39	1
TBSC	5.83	2	6.67	3	4.91	4	6.83	2	6.17	3
TBNC	5.29	3	4.38	5	6.57	2	3.33	4	4.39	4
UBC	4.89	4	4.81	4	5.80	3	2.17	6	4.11	6
TBCC	4.73	5	7.81	2	2.71	5	7.17	1	4.33	5
ARC	3.78	6	3.71	6	2.63	6	3.50	3	6.22	2
All types of rice	5.29		5.99		4.95		4.28		5.43	
Number of respondents	80		21		35		6		18	

With regard to types of rice, some varieties appear discriminant, whereas others do not.

The maximum difference between the highest and the lowest mean values goes from only 1.92 for TBS, to more than 5 for TBC and Basmati (5.1 and 5.86 respectively). However, we must notice that the situations of these two varieties of rice are different, since a really small number of respondents reject Basmati rice. These differences are confirmed by respondents' ranking : whereas TBS is always ranked from 2 to 4, it goes for TBC and Basmati from 1 to 5.

In terms of managerial implications, these results are important : mean values obtained by TBC and TBS are not really different, but TBC appears as much more segmenting, while TBS is more or less accepted by all groups of consumers.

## Discussion and conclusion

The first objective of the study was to examine relations between consumers and rice in general. Results show that on the one hand, respondents exhibit both positive perceptions of rice, and high levels of satisfaction with their rice consumption, rather high involvement in cooking and variety-seeking, but that, on the other hand, those two types of variables are not closely related.

The second part of this research was dealing with consumer preferences for different types of rice. Three groups appeared : Basmati rice, ranked first, parboiled rice, and natural types of rice, with the lowest values. However, within parboiled types of rice, TBS (Thai Bonnet Standard) appears apart from the others, since it is



both positively correlated with Uncle Ben's and TBN ( New Thaï Bonnet), and positively correlated to cooked TBC (Thaï Bonnet Natural), a natural type of rice.

After having tested the relations between these preferences and the two sets of variables presented above - consumers attitudes, food-related profiles and other individual factors, it is interesting to note that there seems to be a link between visual evaluation of raw rice and tasting evaluation of cooked rice. On the contrary, data analysis reveals very few significant correlation between notes given to the different cooked types of rice, and food-related or socio-demographic consumers' profiles, or with perceptions of rice.

In terms of managerial implications, it is a major result, since it shows the importance of packaging. Consumers, when they see the rice, already form an opinion on it, so it shows how it is interesting to give them, with a suitable packaging, the possibility of seeing it.

This paper presented only partial findings of a quantitative study, based on a questionnaire which was identical for all European participant countries. The behaviour-attitude-opinion data collected with this questionnaire will permit comparative measures and therefore enable cross-cultural analysis of rice consumers.

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## References

*Evrard and Aurier (1996), Identification and Validation of the Components of the Person-Object Relationship, Journal of Business Research, 37, 127-134*

## Figures and tables summary

 [Figure 1](#)

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