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Strategies of the rice processing industry in the area of Vialone Nano Veronese*

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Résumé. *Cette recherche a pour but l'analyse des aspects structuraux des industries de transformation de la zone typique du Vialone Nano Veronese, la définition des stratégies des entreprises et la détermination des éléments principaux de développement et des liens. Elle a été conduite sur les données recueillies à travers des interviews directes sur questionnaire. Les informations obtenues ont été élaborées en deux phases.*
• La première a permis de délinéer les caractéristiques des entreprises à travers l'analyse des données agrégées; on a vérifié l'impact qu'elles déterminent sur l'économie locale ainsi que les stratégies de vente et de promotion.
• Dans la seconde phase, la Cluster Analysis *a été utilisée pour vérifier l'existence des groupes homogènes d'en - treprises sur la base de quelques caractéristiques structurelles. En se référant à une conception de la structure d'entreprise large, on a déterminé comme variables critiques la dimension (quantité produite), l'organisation (nombre d'employés) et la propension à l'innovation (production de riz étuvé et complet). La* Cluster Analysis *a été appliquée suivant la technique* K-means *non-hiérarchique et on a obtenu quatre typologies d'industrie, qui coïnci - dent avec autant de regroupements stratégiques. Ils ont été analysés à travers les stratégies principales afin d'éla - borer des modèles interprétatifs.*
Pour vérifier le degré de séparation parmi les groupes, on a choisi comme méthodes statistiques confirmatives l'analyse discriminante suivant la procédure stepwise*.*
En conclusion, on a mis en évidence les points forts et faibles du secteur et identifié les perspectives de dévelop - pement des différentes typologies d'industrie surtout en relation avec leur adaptation aux conditions de la filière, avant et après la transformation, dans le cadre d'une niche de marché spatialement bien définie.

Abstract. This paper analyzes the structural aspects of rice mills situated in the typical area of Vialone Nano Veronese, defines their strategies and, finally, identifies the main development factors and linkages. The research is based on data collected in direct interviews with a specially prepared list of questions. Information was processed by two different methods of statistic analysis.
• The **first phase** of the research was to define the characteristics of the firms through the analysis of aggregate data; it was possible to verify results on the local economy, and strategies of sale and promotions.
• In the **second phase**, cluster analysis was used to stress homogeneous groups of rice mills in terms of structural characteristics. Faced with a wide concept of firm management, three k variables were selected: dimensions (quantity of rice), organisation (number of employees) and tendency to innovation (production of parboiled and brown rice).
Cluster analysis was applied following the non hierarchical «K-means» obtaining four typologies of rice mill coinciding with as many strategic groups. These were analyzed with a view to defining models of interpretation.
In order to verify distances between groups, discriminant analysis using the stepwise method was chosen.
In conclusion, development factors and linkages for different groups were identified in relation to their fitness for market conditions, and for forward and backward transformation, in such a specific niche as the Vialone Nano Veronese area.

I – Structural characteristics: a survey of the Italian rice industry

Italian rice production accounts for about 68% of the total EU output; the rest is cultivated in Spain, France, Portugal and Greece.

In 1994 rice cultivation in Italy covered 236,000 ha, 24% more than in 1994 and 9.30% more than in the last two years. The most productive areas are the provinces of Novara, Vercelli, Pavia, Milan and Alessandria, which account for 92.2% of national production. The areas of Novara, Vercelli, Pavia alone cover a good 41.3% of the SAU (185,432 ha).

Lombardy and Piedmont are also the regions where most of the rice processing industry is located. The 116 Italian rice mills are of greatly varying sizes, ranging from small artisan concerns to large factories. Their turnovers range from a few hundred million lires to 250 billion. The two rice associations, AIRI and UNIONRISO, unite the 44 largest mills responsible for processing a good 95% of the total production. The interests of the other mills are largely local. From an analysis of the entire industry one's first impression is that of a high degree of concentration: the Gini index figure, calculated on the quantity of rice processed, is 0.8. But if we only consider the mills associated with AIRI and Union Riso, the concentration figure drops to 0.653. This shows a high degree of pulverisation, above all if compared with the situations in other European states. Thus a few big mills hold a sizable share of the national market (the top five mills process 54% of production); the medium-sized mills are characterised by a market that is smaller but no less competitive; while a large number of artisans and farmers process paddy as a secondary occupation.

An area of production which is smaller, but nevertheless interesting on account of its product type, is the part of the Po Plain included in the provinces of Mantua and Verona. Here cultivation covers a total of 2,300 ha: that is, less than 1% of the area for rice cultivation in Italy. In this area a century-old farming tradition has preserved a local and very individual variety of rice, called Vialone Nano Veronese. Within this process of differentiation, cultivation has grown faster than the national average with a high consumption potential determining niche strategies *(Table 1)*.

Encouraged by market demand, the rice mills have increased their processing capacity (more than local agricultural production) and have widened the supply to none-typical products. Our research into this area of production is justified not only by the particular dynamics distinguishing it from the national average in this sector, but also by the high quality of Vialone Nano Veronese.

Though smaller in size, this industry reproduces the structural characteristics of the larger national companies (i.e. those associated with AIRI and Union RISO): the Gini index figure, calculated on the quantity of paddy processed by local mills, is 0.641.

II – Objectives and methodology of the research

The objectives of the research can be summarised as follows: a) analysis of the structural aspects of the rice mills in the typical area of Vialone Nano Veronese; b) identification of the company strategies; c) identification of homogeneous strategic groupings; d) definition of the main elements of development and of the principal limitations.

With reference to the methodology proposed by Coda, a company is seen as a system formed by a complex of structural, behavioural and result variables in continuous interaction with the surrounding environment. The structural variables are the institutional, organisational and patrimonial organisation of the firm. If we consider structure in a broader sense, however, it should also include the know-how accumulated in the course of activity. The behavioural variables include the decisional components defining the strategies of structural and operative development. These may be evaluated by parameters of efficiency (i.e. operative management) and efficacy (i.e. strategic direction). The result variables, on the other hand, are the company's products seen in the broadest possible sense: economic and financial results, competitive results, social and developmental results *(Chart 1)*.

Chart 1. Components of the company system

Structural variables	Physical structure, patrimony, organisational structure, know-how and experience
Behavioural variables	Operative management, strategic direction
Result variables	Economic and financial results, competitive results, social and developmental results

The company system acts on the environment, which is seen as a complex of limitations, opportunities and threats to a company's development. The environment is not neutral, therefore, insofar as the situations and subjects constituting it condition the management strategy of the company, which must formulate a project with goals that are compatible with those of the environment.

Although the rice mills in the typical area of Vialone Nano Veronese all operate in the same area, they are sharply distinguished by structural, behavioural and result variables. It was particularly interesting, therefore, to examine how the various firms oriented their strategies with a view to interpreting the needs of the market and matching them with their own needs.

To this end, information was obtained through a special questionnaire on the strategic orientations of the 22 rice mills in the area. The mills are medium-size and small firms evenly spread out over the territory of production *(Table 1)*. The data collected served to process interpretative models on which to base hypotheses of development through the promotion of strengths and the limitation of shortcomings.

The main strategies analysed in this research may be classed according to the following aspects of each company's interests and interactions: product mix, social, organisational and functional of typical management. Analysis of these strategies helps understand the complex workings of the company system.

The product mix strategy implies the control of the supply sources so as to guarantee production and margins of profitability through the most rational use of resources[1]. The social strategy aims to ensure the consensus of the interacting environment by supplying the necessary resources, structures and support. The organisational strategy defines the various decisions aimed to mediate between the needs of the company and the diverse types of external conditioning. Finally, the strategies functional of typical management summarise the R & D, production and marketing mix choices chosen with a view to pursuing the strategic advantages needed to optimise profit and the economic-financial cycle of the firm.

Within this methodological framework, the questionnaire was divided into 6 sections corresponding to the company's areas of interest and interaction. These sections permit us to identify the company type and the strategies of supply, processing, sales, promotion and advertising. For the definition of the company characteristics, the main indicators are those of production capacity and management type. Supply strategy is identified by the quantity and quality of rice, paddy and parboiled purchased, differentiated by type of supplier (in turn subdivided into managerial type and area of provenance). The productive strategy is defined by: production in the last ten years, processing for third parties (if at all), storage capacity at the plants, and type of packaging per variety. Next come the data concerning the principal selling outlets differentiated by type of product, promotional strategy and advertising channels. Finally, information was collected on the recourse to external services and the main limitations to business growth.

The data collected were recodified and computerised for further processing, which took place in two further phases:

- ❏ processing of univariate statistics to give a preliminary description of the sample on the basis of the clusters of variables considered;
- ❏ application of the techniques of multivariate statistical analysis to identify and describe homogeneous clusters of rice processors.

The first phase of the study permitted us to outline the characteristics of the firms by analysing the aggregate data: this also enabled us to verify the impact on the local economy in terms of allied industry and of sales and promotion strategies.

In the second phase, cluster analysis was applied to verify the existence of homogeneous clusters of firms on the basis of certain structural characteristics. By adopting a broad concept of company structure, we identified the following as critical variables: size (quantity produced), organisation (number of employees) and propensity for innovation (production of parboiled and brown rice). Cluster analysis (non hierarchical K-means technique) was therefore applied, giving four typologies of mill corresponding to as many strategic clusters. These were subsequently analysed through the main strategies coinciding with the six aspects already highlighted, with a view to processing models of interpretation.

Finally, the statistical method chosen to confirm the degree of separation between the groups was discriminant analysis using the "stepwise" procedure.

III – Characteristics of the firms

The firms are characterised by family management and the maximum number of employees is 19. Half the firms employ fewer than 2 employees, thus confirming the artisan character of production *(Table 2)*.

If we consider the evolution of average production in the period 1985–91, we observe a stable sector generally oriented towards the typicity of the rice: the low barriers to access (short supply of raw material and product differentiation) have not prevented the access of two new firms *(Table 3)*.

The linkage between the processing mills and local agriculture is clearly stressed by the supply system: 50% of the mills is supplied by farmers and over 30% by agricultural cooperatives; the broker, so prominent in other sectors, is here only a marginal figure *(Table 4)*.

Supply policies highlight the structural differences between the firms: over 80% of the large mills has recourse to the local market; while the smaller mills (44%) collect over 2/3 of production in the area. Recourse to the national market, on the other hand, involves half of the mills, but the large ones alone purchase over 2/3 of the total. Parboiled, above all, is purchased on the national market *(Table 5)* from a company (Parboriz) specially formed by a group of North Italian rice mills to produce this type of rice at a single plant. This highlights the dynamism of this system of production, which, albeit centred on small- and medium-sized firms, is ready to explore the possibilities of organisational innovation in order to diversify its product mix towards products of expanding demand but which require substantial economies of scale.

An analysis of the processed varieties shows that Vialone Nano Veronese is a constant element at all the mills. The need to carry out economies of scale and the demands of organised distribution explain the importance of Carnaroli, Arborio and Padano, which are produced in other regions of North Italy *(Table 6)*.

We also note that the product mix is broad and varied, but not so complete if we consider the range of types: only 7 firms produce parboiled and only 1 brown rice. We may therefore speak of “product-oriented” mills that do not differentiate supply in accordance with the segmentation of consumption.

We must not forget that despite the considerable degree of variety differentiation in the supply, the actual quantities are modest, and the production figure of 10,000 tonnes is occasionally reached only in the cases of Vialone Nano Veronese, Arborio, Ribe and Parboiled.

With reference to packaging, diversification of supply is limited. Nothing smaller than the 1 kg pack is produced, as the quantity and frequency of consumption in Italy such as to discourage small-size packages. It is also worth noting that direct purchasing, by caterers and consumers, has favoured even larger formats *(Table 7)*.

The standard package proposed by the firms is the paper bag traditionally associated with the product. While this is the only format for certain smaller firms of established traditions, others have extended their product mixes to include the pasteboard box or the vacuum bag *(Table 8)*.

As regards selling outlets *(Table 9)*, alongside traditional forms of distribution (retailers and direct selling to consumers) there is an increasingly widespread recourse to wholesalers (supermarkets, hypermarkets, chains and cooperatives) in accordance with the trends in purchasing behaviour. The outlets to which over 60% of the product is directed are the supermarkets and direct selling to consumers. This confirms the high degree of specialisation in trading, favouring close linkage with the consumer.

Promotion on price and on quantity is not a widespread instrument, insofar as the acknowledged quality of the local product and the stability of consumers' preferences heavily restrict their replaceability with other varieties on the national market.

Moreover, in order to maintain and improve relations with customers, over 3/4 of rice mills resort to advertising through the local press and television, public relations and fairs *(Table 10)*.

Finally, among the main limits to the growth of business, the managers have indicated the difficulty of obtaining credit and the heavy conditions of the same *(Table 11)*.

IV – The strategic groupings

Though the aggregate analysis of the data presents elements of great interest, it does not permit us to form groupings that are homogeneous from the point of view of strategic importance. Cluster analysis was therefore used, taking into consideration the three critical variables mentioned above so as to obtain four typologies of mill that can be referred to the same number of strategic groupings.

Cluster analysis showed how the distances separating these typologies are differentiated. In particular, we notice the distance of cluster 4 from all the others and the closeness of clusters 2 and 3 *(Table 12).*

Verification of these degrees of separation was carried out by applying discriminant analysis, which helped identify two discriminant functions that optimized the differences between the medians of the cluster values. The two functions reveal that only two mills were classified differently on the basis of the probability of belonging to one of the four identified clusters *(Table 13)*.

A detailed description of the characteristics of the identified types is given below *(Chart 1; Tables 14 and 15)*.

Cluster 1. Medium size firms with differentiated strategies

The first cluster consists of four large firms, with more employees (average of 12) and with higher quantities of rice processed (more than half the total).

Although adopting a hierarchical organisational structure, certain administrative functions are shared among members of a single family.

The supply system uses both the local market (Vialone Nano Veronese and Carnaroli) and the national market (all the other varieties). The firms avail themselves of a large spectrum of suppliers, with a prevalence of direct trade with farmers.

The product mix is extremely diversified, with a wide and deep range, and showing an orientation towards the national market though not excluding typical local production. Thus the strong presence of Arborio, Ribe and Originario (varieties consumed nationally) and the high quantity of Vialone Nano Veronese (19.6%). A further fact to be stressed is the concentration of the supply of Vialone Nano Veronese (46.7% of the total) and parboiled (80% of the total).

To confirm the diversification of supply in this cluster, we observe not only a wide range of packaging (including the vacuum bag), but also a strong tendency for adopting low production cost strategies based on production standards and economies of scale.

The analysis of selling outlets shows a strong propensity for organised, rather than traditional, distribution. This guarantees constant supplies of large quantities of rice, and includes possibilities of exportation. Direct selling, on the other hand, is limited, as it is less justified by the scale and capacity of the sales network.

More than the others, this type of firm is oriented towards price promotion, as its products are mainly directed at the national market and are not differentiated from the supply of its competitors. This is why other advertising channels are only rarely used.

Cluster 2. Small size firms with differentiated strategies

The second cluster is composed of three family-run firms of medium to small size (both as regards number of employees and rice production).

Supply is mainly from the national market with frequent recourse to brokers. The product mix is well differentiated, with a wide and deep range of products. In fact the mills are particularly keen to satisfy the needs of different consumer types; to this end they present on the market almost all the main varieties, as well as new products such as parboiled and brown rice. The range of products and the wide spectrum of consumers taken into consideration place these firms in competition with the non-typical products of the large firms in the national market.

The sale of rice is normally entrusted to supermarkets (58%) and traditional retailers (26%); rarely to hypermarkets.

These features justify the fact that one of the three firms uses promotion based on price and quantity, a method characteristic of highly standardised products.

It is therefore a cluster of firms with strategic choices closer to those of large mills, but whose main limitation is production quantity.

Cluster 3. Small firms specialized in local markets

The third cluster is composed of six firms of larger productive dimensions than those of the preceding type, but with a product mix of less depth.

The supply strategy is substantially the same as that of Cluster 2, though with a more strongly pronounced presence of the broker for the non-typical products. This cluster includes the only firm to import rice from Thailand.

These firms combine typical production (Vialone Nano Veronese and Carnaroli account for more than half the cluster's total supply) and other varieties of rice. The product mix is limited, given the lack of interest in parboiled and brown rice.

Each firm has a strong brand image at a local level, often linked to packaging type. The main commercial strategy is to stress brand importance as much as possible.

In conclusion, Cluster 3 consists of firms that concentrate on quantity and processing technology so as to limit costs and to assure top quality standards. To this end, they use all forms of advertising to improve their image and publicise the brand even across district borders.

Cluster 4. Artisan firms specialized in local products and markets

The last cluster consists of nine small firms that use traditional methods of processing and whose products accounts for only 2.7% of the total.

The management of these firms is typically in the hands of the head of the family, who assumes all functions and who often carries out other agricultural activities either independently or for third parties.

Supply is local and direct, through either local farmers or agricultural cooperatives, thus confirming a strong linkage with rice growers.

The product mix is based, therefore, on local varieties (90% Vialone Nano Veronese, 5.6% Carnaroli), which are still processed according to traditional methods that stress the uniqueness of the product. In fact processing is carried out in limited quantities under the continuous control of the manager, who is often the custodian of jealously guarded secrets handed down from father to son.

These firms are part of the history of the areas where rice has been cultivated for centuries. Until the last world war, they were the only processing mills available. Buying rice from them is therefore a tradition for the families living in those country areas, even if they are no longer involved in production. Furthermore, these mills have attracted many urban consumers looking for products with strong natural characteristics. Direct selling accounts for 40% of production; the rest is distributed to small supermarkets and traditional retailers.

Packaging, which depends on the channels of distribution, also includes sizes larger than the 5 kg pack; the main format, however, is the traditional 1 kg paper bag.

Promotion and advertising is done through local television and, above all, through fairs and by public relations, instruments that are more effective at stressing the product image.

V – Conclusions

The analysis stresses the strengths and weaknesses of a sector in which intervention is needed if a competitive advantage in the long-term is to be achieved.

This is why one urgent priority is that of establishing a statute to define the production area of Vialone Nano Veronese, the organoleptic characteristics of the rice and the processing methods safeguarding its quality. Such an action is the indispensable basis for establishing a certification mark to be supported by suitable instruments of marketing mix.

Within this scenario, not all the firms would be able to maintain their present strategies, as they are still not clearly oriented towards cost leadership or differentiation. This would particularly affect the firms of Cluster 2: as we have seen, they are still unable to implement the economies of scale typical of Cluster 1; at the same time they are oriented to a supply with low quantities of local rice and, as such, exposed to greater market competition. The situation of the third and fourth clusters, on the other hand, is different. In Cluster 3, the firms have opted for a strong differentiation of supply while concentrating on the typical local production. In Cluster 4, the niche strategy based on Vialone Nano Veronese requires investments in technology and marketing. This highlights the fact that most of the firms are exploiting a short-term advantage from favourable market conditions that—above all in the last few years—have seen considerable expansion in this sector. Whether or not they will be able to turn this advantage into a medium- and long-term success will depend on their ability to realise certain well-defined basic strategies.

While the favourable pedoclimatic conditions for cultivation and the managerial know-how developed over the centuries are the key factors in differentiating Vialone Nano Veronese from other varieties, the major limiting factor is the vertical system for rice. In fact, analysis has stressed the presence of low barriers to access, due to the structural weakness of the firms and to the lack of product promotion policies based on differentiation strategies. This lack strongly exposes the product to national and foreign competition.

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Table 1. Structural data concerning Italian rice farms

	1987	1988	1989	1990	1991	1992	1993
Italy							
Production (,000 tons)	1 064	1 112	1 247	1 291	1 244	1 286	1 284
Surface (,000 ha)	190	198	206	214	205	216	231
Productivity (t/ha)	5.6	5.6	6.1	6.0	6.1	6.0	5.6
Verona							
Production (tons)	5 458	6 401	7 282	7 452	5 540	7 195	9 227
Surface (ha)	951	1 143	1 374	1 355	1 108	1 439	1 784
Productivity (t/ha)	5.7	5.6	5.3	5.5	5.0	5.0	5.2

Source: *Ente Nazionale Risi.*

Tableau 2. Number of employees per firm

	Number of firms	%
To 2 employees	11	50.0
From 3 to 5 employees	8	36.4
More than 5 employees	3	13.6

Tableau 3. Evolution of production of tested firms

	1985 (*)	1991
From 1 to 100 tons	6	6
From 101 to 1 000 tons	6	5
From 1 001 to 5 000 tons	6	7
More than 5 000 tons	2	4

(*) in 1985 two firms were not present on the market.

Table 4. Purchasing system per type of supplier

	Total		1%–30%		31%–60%		61%– 100%	
	Number of firms	%	Number of firms	%	Number of firms	%	Number of firms	%
Paddy								
Brokers	5	22.7	0	0.0	1	4.5	4	18.2
Other firms	2	9.1	1	4.5	0	0.0	1	4.5
Agricultural co-operatives	7	31.8	3	13.6	2	9.1	2	9.1
farmers	11	50.0	1	4.5	3	13.6	7	31.8
Unpacked and parboiled								
Brokers	1	4.5	0	0.0	1	4.5	0	0.0
Other firms	7	31.8	0	0	1	4.5	6	27.3
Industrial co-operatives	1	4.5	0	0	0	0	1	0

Table 5. Purchasing system per type of market

	Total		1%–30%		31%–60%		61%– 100%	
	Number of firms	%	Number of firms	%	Number of firms	%	Number of firms	%
Paddy								
Local market	18	81.8	7	31.8	3	13.6	8	36.4
Nationalmarket	10	45.5	0	0	3	13.6	7	31.8
Foreign market	1	4.5	1	4.5	0	0	0	0
Unpacked and parboiled								
Local market	4	18.2	1	4.5	1	4.5	2	9.1
National market	7	31.8	1	4.5	1	4.5	5	22.7

Table 6. Amount of rice per variety

	Total		1%–30%		31%–60%		61%– 100%	
	Number of firms	%	Number of firms	%	Number of firms	%	Number of firms	%
Vialone Nano Veronese	22	100.0	6	27.3	13	59.1	3	13.6
Arborio	13	59.1	2	9.1	7	31.8	4	18.2
Roma	9	40.9	3	13.6	6	27.3	0	0
Ribe	8	36.4	2	9.1	5	22.7	1	4.5
S. Andrea	6	27.3	3	13.6	3	13.6	0	0
Padano	10	45.5	4	18.2	6	27.3	0	0
R.M	1	4.5	0	0	1	4.5	0	0
Originario	7	31.8	1	4.5	6	27.3	0	0
Carnaroli	13	59.1	4	18.2	9	40.9	0	0
Europa	3	13.6	1	4.5	2	9.1	0	0
Parboiled	7	31.8	1	4.5	5	22.7	1	4.5
Brown rice	1	4.5	0	0	1	4.5	0	0

Table 7. Number of firms per weight of package

Variety	1 kg	1–5 kg	More than 5 kg
Vialone Nano Veronese	21	18	10
Arborio	12	9	7
Roma	8	8	7
Ribe	7	7	6
S. Andrea	7	6	6
Padano	9	7	5
R.M	2	1	1
Originario	6	6	5
Carnaroli	13	10	6
Europa	4	3	3
Total	**21**	**19**	**10**

Table 8. Type of package

	Number of firms	%
None	1	4.5
Only paper bag	10	45.5
Only pasteboard box	1	4.5
Pasteboard box and cellophane	2	9.1
Paper bag and vacuum	1	4.5
Paper bag and cellophane	1	4.5
Paper bag, pasteboard box and cellophane	4	18.2
All	**2**	**9.1**

Table 9. Sales channels

	Total		To 30%		30–60%		More than 60 %	
	Number of firms	%	Number of firms	%	Number of firms	%	Number of firms	%
Direct selling	10	45.5	5	50.0	2	20.0	3	30.0
Exclusive leaders	1	4.5	1	100	0	0	0	0
Italian exporters	1	4.5	1	100	0	0	0	0
Hypermarkets	8	36.4	7	87.5	1	12.5	0	0
Supermarkets	20	90.9	8	40.0	7	25.5	0	0
Retailers	16	72.7	12	75.0	4	25.5	0	0
Chains and co-ops	5	22.7	5	100	0	0	0	0

Table 10. Promotion and advertising

	Number of firms	%
Promotion	**3**	**13.6**
on price	3	13.6
on quality	1	4.5
Advertising	**17**	**77.3**
press	9	40.9
local television network	14	63.6
radio	2	9.1
bill-posting	1	4.5
public relations	11	50.0
fairs	6	27.3

Table 11. The main linkages to firm development

	Number of firms	%
Water quality	2	9.1
Authority licence	1	4.5
Building linkages	6	27.3
Facilitated credit	15	68.2
Fide jus	2	9.1

Table 12. Euclidean distances between cluster centroids

Cluster	1	2	3	4
1	0,0000			
2	1,6029	0,0000		
3	1,5501	1,2134	0,0000	
4	3,1469	1,8720	1,8028	0,0000

Table 14. Rice production per cluster

	1 (n=4)		2 (n=3)		3 (n=6)		4 (n=9)		Total (n=22)	
Variety	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
Vialone Nano V.se	6,050	46.7	1,070	8.3	4,690	36.2	1,143	8.8	12,954	100
Arborio	8,900	54.0	1,779	10.8	5,790	35.1	3	0	16,474	100
Roma	1,750	70.6	560	22.6	170	6.8	0	0	2,479	100
Ribe	2,400	74	595	18.3	250	7.7	0	0	3,245	100
S. Andrea	500	26.3	328	17.3	1,070	56.3	0	0	1,899	100
Padano	1,600	64.6	217	8.8	630	25.5	28	1.1	2,475	100
R.M.	0	0	119	100	0	0	0	0	119	100
Originario	2,000	84.7	160	6.8	200	8.5	0	0	2,361	100
Carnaroli	700	24.4	430	15	1,580	55	161	5.6	2,871	100
Europa	950	95	0	0	50	5.0	0	0	999	100
Parboiled	3,200	83.1	650	16.9	0	0	0	0	3,850	100
Brown rice	0	0	200	100	0	0	0	0	200	100
Total	**28,050**	**56.2**	**6,110**	**12.2**	**14.430**	**28.9**	**1,335**	**2.7**	**49,925**	**100**

Tableau13 : Discriminant analysis: territorial map of centroids

* indicates a cluster centroid (assuming all fonctions but the first two are zero)

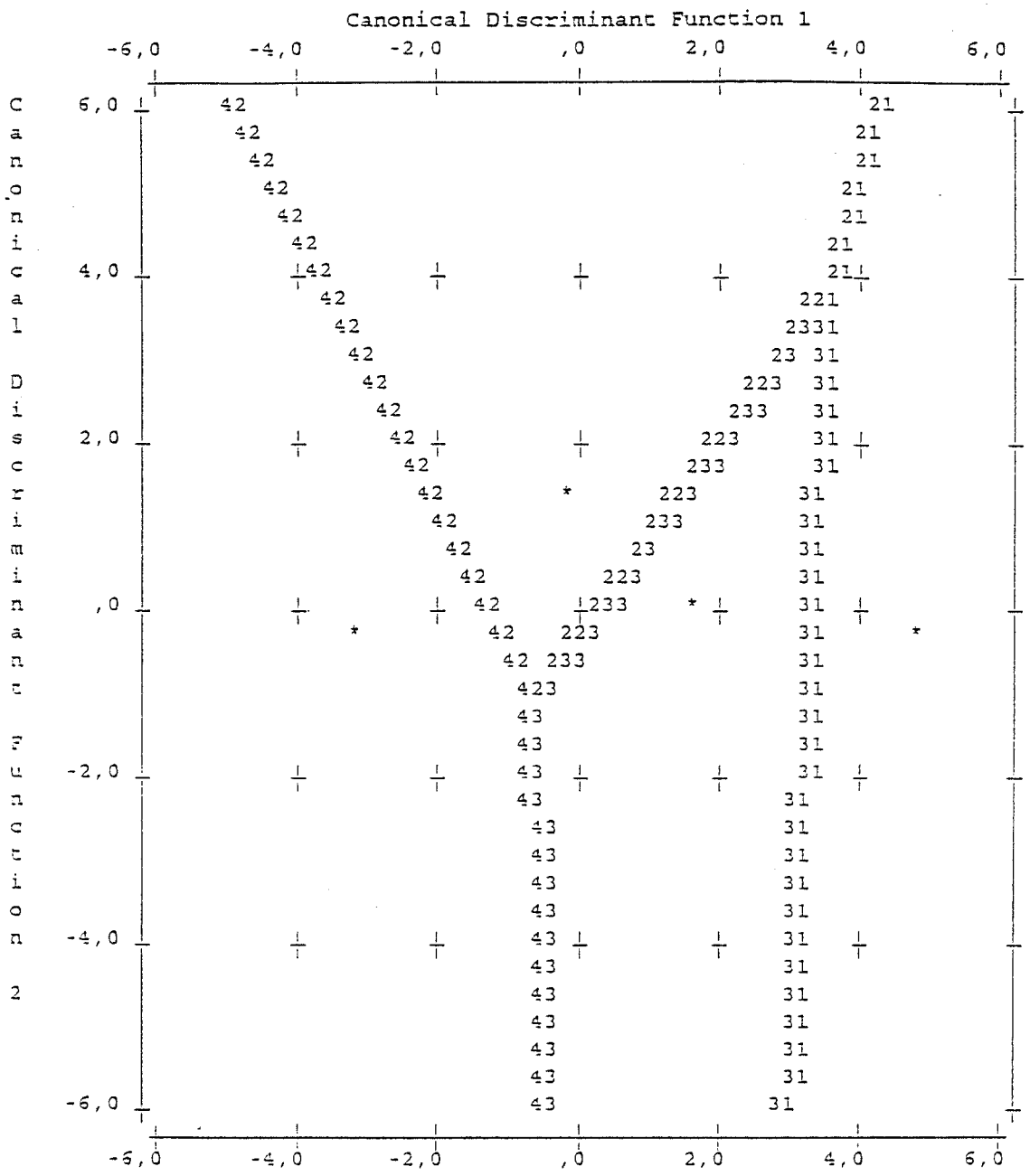

Tableau 15. Product mix per cluster

Variety	1 (n=4)	2(n=3)	3 (n=6)	4 (n=9)	Total (n=22)
Vialone Nano Veronese	19.6	16.3	44.2	90.5	54.9
Arborio	29.9	36.4	28.6	0.3	18.4
Roma	6.2	7.1	2.1	0	2.9
Ribe	8.5	9.0	1.2	0	2.8
S. Andrea	2.3	5.2	4.7	0	2.4
Padano	4.8	2.6	190.1	3.6	5.4
R.M	0	2.0	0	0	0.3
Originario	7.1	2.7	1.0	0	2.0
Carnaroli	3.2	7.2	7.9	5.6	6.0
Europa	4.5	0	0.2	0	0.8
Parboiled	13.9	9.3	0	0	3.8
Brown rice	100	100	100	100	100

(1) As one may notice, no examination is made of the economic-financial strategy involving all the decisions concerning the management of the firm's resources, with particular reference to limitations of profitability, liquidity and solidity; this tends to prevail over the others, creating problems, in the long term, for the advanced growth of the firm.

Chart 1: Synoptic table of firm typologies

	CLUSTER 1 n=4	CLUSTER 2 n=3	CLUSTER 3 n=6	CLUSTER 4 n=9
Critical variables:				
- Rice production (tons)	28.050	6.110	14.430	1.335
- Mean number of employees (n.)	12,0	2,3	3,3	0,2
- Parboiled production (tons)	3.200	650	0	0
Organization structure	hierarchical	monofunctional	monofunctional	monofunctional (other agricultural activities on one's own account or for third party)
Purchasing system of paddy on the local market (%)	23,6	26,9	22,4	100,0
Purchasing system of unpacked and parboiled on the national market (%)	97,9	18,2	50,0	57,9
Main supplier of paddy (% on paddy)	farmers and agricultural co-operatives (40,4 and 28,3%)	brokers (41,8%)	brokers (55,9%)	farmers (96,7)
Main supplier of unpacked rice and parboiled (% on unpacked rice and parboiled)	other firms (100%)	other firms (100%)	other firms and brokers (50% and 50%)	industrial co-operatives (57,9%)
% of Vialone Nano Veronese on total of product mix	18,6	16,3	44,2	90,6
Share of Vialone N. V. production of the cluster on the total of the area (%)	46,7	8,3	36,2	8,8
% of Parboiled on total of product mix	13,9	9,3	0,0	0,0
% of Brown Rice on total of product mix	0,0	2,2	0,0	0,0
Other main variety (% on total of product mix)	Arborio (28,9%)	Arborio (35,4%)	Arborio (28,6%)	Carnaroli (5,6%)

	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4
Sales channels: (% on the amount of sales)				
- hypermarkets	25,6	12,7	5,8	0,0
- supermarkets	28,0	58,0	59,0	30,8
- retailers	5,0	28,0	13,0	29,0
- chains and co-ops	11,5	0,0	3,8	0,0
- direct selling	2,5	3,3	1,7	40,2
- exclusive dealers	0,0	0,0	5,0	0,0
- exporters and importers	27,5	0,0	11,7	0,0
Kind of package	paper bag, pasteboard box, cellophane and vacuum	paper bag, pasteboard box, cellophane and vacuum	paper bag, pasteboard box, cellophane and vacuum	paper bag and cellophane
Promotional activities	on price (two firms)	on price and quantity (one firm)	none	none
Advertising activities	poorly utilized	poorly utilized	press, local television network, radio, bill-posting, public relations and fairs	press, local television network, public relations and fairs