FRANCIACORTA DOCG SPARKLING WINE INTERPRETATION IN RELATION TO WINE COMING FROM DIFFERENT AREAS

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Abstract

In the classical tradition the sparkling wines are a blend of wines with different origin. Likewise, the decision of the sparkling process typology "brut, extra brut, zero dosage" is defined from the sensorial results obtained at the end of bottle refinement. So, the choice of the "*liqueur de triage*" and of the "*liqueur de expedition*", is to be considered a way to characterize and affirm the company mark, more than valorize the peculiar characteristics of the production areas.

In order to study the territorial differences of Franciacorta DOCG sparkling wines, in the period 2000-2002 a production protocol associated to the sensorial profile that blend different kind of wines produced in the same area was established. The dynamic concept of site evaluation was applied considering as a whole the system *terroir*-vine.

The experience outlines a great constancy of the vineyards expressing its own characteristics, when its relative to same area, justifying a blending that increased the value of the peculiar characteristics.

The results indicate that the expressed variability from the wines obtained from the vineyards in the same area, justify a way of producing that able to valorize the territory's importance in all different sparkling processes.

Résumé

Dans la tradition classique, les vins mousseux sont le produit d'assemblage des vins d'origine différent. La choix de la typologie du moussage (brut, extra-brut, dosage zéro, etc.) généralement est une conséquence des résultats organoleptiques atteints à la fin de le période d'affinement en bouteille. La choix de la liqueur du tirage et de la liqueur d'expédition est considérée un moyen pour particulariser et affirmer le marque d'entreprise, plutôt que mettre en valuer les caractéristiques du territoire de production.

Afin d'étudier les différences territoriales entre Franciacorta, on a réalisé un protocole de production que a prévu l'association des vins du vignoble produits dans le periode 2000-2002 avec profils organoleptiques, basés sur le binomie *terroir*-cepage.

L'expérience revalorise une remarquable constance des vignobles dans l'expression du pays, justifiant un assemblage que évalue ces particularité.

Les résultats obtenus indiquant aussi, que la variabilité exprimée par les vignobles cultivés dans la même région (sélection de la mésozone o unité vocationalle) est suffisant pour justifier ce approche, en mesure d'évaluer le rôle du territoire d'origine aussi dans le plus variables expressions de vins mousseux.

1. Introduction

The Italian sparkling wine elaborated through the classic method is historically linked to the tradition of Champagne area. The desire to emulate the traditional sparkling wines also in areas geographically and pedologically different, brought to the develop new kinds of agronomical and oenological production techniques. This was made in order to sure the oenological purpose rather than valorise the different "*terroirs*". It is recognized that sparkling wine is a product more technological than oenological, in which grapes are mainly used to express the sensorial characteristics due to

fermentation in bottle rather than their origin. In the last thirties years of the past century the theory that exist two different viticulture techniques has been developed: the first for still wines, the second for sparkling wines, indicating with this term the technique focused on grapes with low sugar degree and high titratable acidity.

Statistical data analysis regarding the consumption of classic sparkling wines in Italy does not seem to reward this strategy because their sales didn't show any changes during the last twenty years. It is interesting to remark that in Italy only the Franciacorta area, sited near Milan, was able to develop and promote its sparkling products. This was mainly due to the capacity to produce a wine with sensorial properties strongly linked to characteristics of *terroir*. According to that the classic sparkling wine produced in this area is named Franciacorta DOCG – guaranteed and controlled origin denomination.

The Franciacorta enjoys a moderate growing season that allows the grapes to mature slowly and early, producing fruit balanced in color, flavor and acidity, and creating the distinctive flavors for which the vineyards have become well known. Winemakers recognized the climate of this region as perfectly suited to the cultivation of *Chardonnay* and *Pinot Noir* for sparkling wines, and have come to focus almost exclusively on producing these wines.

The commercial success, jointly with the pedological and climatic characteristics of this zone, aimed the study of zoning of the Franciacorta area. The soil survey evaluated physically, chemically, and hydrologically the territory of Franciacorta and defined six different vocational units (homogeneous zones or units of soil) on a scale of 1:25.000 (soil map), able to characterize the peculiarities of the Franciacorta area.

To optimize vineyard performances in the zoning approach information about soil traits is linked to data about micro-climatic conditions (Falcetti and Iacono, 1996). Data may be successfully managed by vine growers in order to modify yields suitable for classic sparkling wines. Wine quality, as body and organoleptic complexity, is viewed as the outcome of a complex set of interactions that involve the most important factors that define the environment (Iacono et al., 1994; Scienza et al., 1992) and may be considered the result of the interrelationships between grapevine and soil (different environments and climate conditions).Wines from one soil (defined also by microclimatic boundaries) of the same area can be proven to taste different from wines from another based on flavor differences that are grape based: in fact the flavor differences are linked to where the grapes are grown, not to the winemaking. A viticultural *terroir* is seldom defined as a region which is related to a particular area with a distinct quality of grapes and their wines. Typicality refers to geographically referenced products (Vaudour, 2002). Because the *terroir* allows the production of wines characterized by organoleptic typicality, the zoning approach becomes an important commercial vector for the wine productive sector. In order to obtain high typicality of wines and constancy in the years it is very important to use the dynamic concept of site evaluation, able to combine in a multidimensional analysis all the factors involving variability and to consider the system *terroir*-vine-wine as a whole (Iacono and Scienza, 1999; Iacono et al. 2000; Scienza et al., 1996). The combination of spatial modeling and geographical information system (GIS) data can update the concept of *terroir* provided the area, scale and resolution of each so-called *terroir*-unit are more carefully specified and fully related to viticultural data (Vaudour, l.c.). Because the decision of the sparkling process typology "brut, extra brut, zero dosage" is defined from the organoleptic results obtained at the end of bottle refinement, it is very important to define which way is more suitable to characterize and affirm the company mark, valorizing also the peculiar characteristics of the production areas.

The present study was carried out to verify the influence of the six vocational units on the final wines mainly produced from *Chardonnay* and *Pinot noir* varieties.

Because common sensory characteristics of wine are frequently the result of many different compounds with varying perception thresholds (Ferrier and Block, 2001) and in order to create specific classic sparkling wines from each vocational unit, a new blending method is proposed.

The trial was carried in the Fratelli Muratori estate because it cultivates vineyards in all the different vocational units of Franciacorta and uses the systemic method (dynamic approach) in order to define suggestions to adapt site conditions to its commercial targets.

2.   Materials and methods

Data refer to wines produced in the winery of Fratelli Muratori estate, situated in Adro (BS - Italy). In the 2000-2002 period the grapes produced in several vineyards distributed in the six vocational units of Franciacorta were separately processed and vinified. As already reported the previous job of zoning organized the Franciacorta in six vocational unit (VU) on the basis of their landscape genesis (Soil Survey Staff, 1994). The characteristics of each unit are summarized in table 1. All the vineyards were cultivated with *Chardonnay* except the vineyards sited on the Unit 5, cultivated with *Pinot noir*. The vineyards were managed according to standardized techniques.

The wines coming from the first selections of pressing have been maintained in purity until tasting, while that ones from the second selections have been assembled in relation to the vocational unit of origin (tables 2 and 3).

The wines have been evaluated through a sensorial descriptive method, a powerful and versatile technique used when there are large sensory differences among wine samples. A panel of at least 10 judges was used. Descriptor terms were defined after several taste sessions, and the relevant terminology underwent normalization. Data, after standardization (mean equal 0 and standard deviation equal 1) by judges to avoid the difficulty of elaborating data obtained from the use of different scales, were processed by the ANOVA.

The wines from the first vintage were used to establish the sensorial profile for each vocational unit, named *model profile*. In order to estimate the coherence of sensorial properties of the wines from different units to the *model profile* of the unit of origin, an approach named *affinity judgment* has been established. On the basis of this model each judge had to combine the sensorial profiles of each wine with the *model profiles* of each unit by giving a score ranging from 0 to 10. The wines from the three vintages were successively blended according to two different strategies: on the basis of both wine origin and *affinity judgment*. Also the wines from blending were sensorially described. The profile of the wines blended according to their origin was named *theoretical*, while the profile obtained from *affinity judgment* was named *effective*. Data from all the wines were processed by ANOVA.

3. Results and discussion

3.1   Definition of the *model profile* according to the vocational unit of origin

ANOVA showed that the origin of grapes significantly affects the sensorial profile of the wines (table 4). The interaction between vineyards and vocational units was not significant and therefore is not reported. The figure 1 shows that sensorial differences involve both aromatic and gustatory characteristics. The results are represented for each vocational unit as the average of the vineyards sited on the specific area. Unit 1 produces wines with a balanced profile, Unit 2 wines with toffee, rose and herbaceous like flavors, while Unit 3 wines with floral like flavors. Unit 4 produces wines with citrus fruits like flavor and *Pinot noir* from Unit 5 shows to be spicy and bodied. Unit 6, finally, produces wines with floral and fruity flavors.

3.2.   Application of the *affinity judgment*

The wines were analyzed from the sensorial point of view through the method of the *affinity judgment*. Wines of each year were processed and the results are represented in tables 2 and 3. In these tables numbers refer to hectoliters of wines produced from each vineyard and available for blending. The bottom line represents the percentage of correct origin of wines in each blend done for each unit. In the vintage 2000, table 2a, is shown that only the wine from the vineyard Novali in Unit 2 was not correctly attributed and this happened in 50% of the cases. In the vintage 2001, table 2b, only the wine from the vineyard Villa in Unit 4 was not correctly attributed in 33% of the cases. In the vintage 2002, table 3a, all the wines were correctly assigned. The wines from second selections of pressing showed larger amounts of wrong attributions. In the table 3b the average results are shown. From this table it is possible to deduce that, regardless the vintage, in the majority of cases the wines were correctly attributed to the unit of origin. The percentage of correct attribution to the origin was always greater than 87%.

3.3.   Comparison among *model, theoretical* and *effective* profiles

As reported in materials and methods the wines were also blended only on the basis of their origin. The *theoretical* model reduced the differences among the units. ANOVA showed that by applying the *theoretical* model only spicy and toffee like flavors resulted significantly different (table 4); on the other hand, after choosing specific target attributes for the final blend, the *effective* blends, by using the *affinity judgment*, were able to give wines with sensorial properties very close to those of the *model* profiles. We report the comparison among the sensorial profiles obtained through *model*, *theoretical* and *effective* approaches for the different units (figures 2, 3, 4, 5, 6, and 7). These figures show that the optimization employed by using the *affinity judgement* implies sensorial profiles close to the goal characteristics of each unit of origin.

4.   Conclusions

According to the aims of the trial, the results allow to improve the knowledge about the influence of *terroir* on the classic sparkling wines. Some suggestions can be summarized as follows:
* the method applied demonstrates that the vocational units of Franciacorta are able to characterize the sensorial profiles of wines;
* the differences of the wines recorded during the period of experience were statistically significant and therefore the environment is a strong factor of variability;
* the vintage seems to be not able to modify the *model* profile of the vocational units;
* the quality of selection done during grape pressing affects the sensorial profile of the wines regardless their origin and therefore their use in blending must be carefully evaluated.

In order to obtain wines from *terroir* it is important to know the influence of the environment on the final quality, but at the same time it is also important to guarantee a stable level of quality. The *theoretical* approach applied in this study, simply based on the blend of the wines according to their origin, show that the results can not match with the *model* sensorial profile.
This result put in evidence that apparently similar wines blended together can produce different wines.
The application of the *affinity judgment* method here proposed, allows to obtain wines from *terroir* stable during the years, by guaranteeing high percentage of correct presence of units. The results show that in this way it is possible to emphasizes the role of *terroir* also in the classic sparkling wines strategy.
Furthermore the trial shows that the approach suggested can be easy applied in a commercial winery and that the method of *affinity* is easier and less complex than descriptive techniques. It can be successfully used in selecting for quality and to make production decisions based on wine style by constructing a series of different wines from the base wines coming form vocational units.

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Table 1: pedological and climatic characteristics of the vocational units of Franciacorta; varieties cultivated and sparkling process typology of Fratelli Muratori estate.

Vocational Unit (VU)	Geological origin	Soil characteristics	Lying position	Weather conditions	Variety	Sparkling process typology
VU1	Thin deposits	Deep, low in gravel, silt loam	Valley bottom	Continental	*Chardonnay*	Extra brut
VU2	Fluvio- glacial	Deep, medium in gravel, sandy loam	Valley bottom	Continental	*Chardonnay*	Brut
VU3	Distal colluvials	Deep, low in gravel, clay loam	Valley bottom	Continental	*Chardonnay*	Extra Dry
VU4	Deep Morainic	Deep, high in gravel, clay loam	Medium hill	Mediterranean	*Chardonnay*	Zero dosage
VU5	Colluvial terraced	Deep, low in gravel, clay	Foothill	Mediterranean	*Pinot noir*	Zero dosage
VU6	Thin Morainic	Thin, high in gravel, sandy loam	High hill	Mediterranean	*Chardonnay*	Satén

Table 2 (a-b): vineyards, vocational unit, type of selection of pressing and creation of blend (*effective* wine) in relation to the *affinity judgment* in the year 2000 (2a) and 2001 (2b). Data in gray indicate hectoliters of wines not correctly attributed to its original unit.

Vineyard	VU	Variety	Type of selection	2a - *Effective* wine 2000							2b - *Effective* wine 2001						
				Hl	VU1	VU2	VU3	VU4	VU5	VU6	Hl	VU1	VU2	VU3	VU4	VU5	VU6
Averoldi	1	*Chardonnay*	1	60	60						125	125					
VU1	1	*Chardonnay*	2	5	5						15	15					
Novali	2	*Chardonnay*	1	40		20		20			60		60				
Martore	2	*Chardonnay*	1	30		30					47		47				
Bettolino	2	*Chardonnay*	1	80		80					130		130				
VU2	2	*Chardonnay*	2	15						15	45		45				
S.Lorenzo	3	*Chardonnay*	1	60			60				90			90			
VU3	3	*Chardonnay*	2	5						5	20			20			
Caneva	4	*Chardonnay*	1	90				90			111				111		
Corte	4	*Chardonnay*	1	80				80			110				110		
Villa	4	*Chardonnay*	1	82				82			90		30		30		30
Valli	4	*Chardonnay*	1	124				124			123				123		
Rampaneto	4	*Chardonnay*	1	150				150			150				150		
Seradina	4	*Chardonnay*	1	150				150			150				150		
Gazzolo	4	*Chardonnay*	1	61				61			60				60		
VU4	4	*Chardonnay*	2	75				75			60			20	20	20	
Fornaci	5	*Pinot noir*	1	120					120		120					120	
VU5	5	*Pinot noir*	2	32					32		30					30	
VU5	5	*Pinot noir*	3	5					5		25					25	
Favento	6	*Chardonnay*	1	90						90	117						117
Ai prati	6	*Chardonnay*	1	80						80	123						123
VU6	6	*Chardonnay*	2	20		10				10	30						30
Total				1454	65	140	60	832	157	200	1831	140	130	312	754	195	300
% of correct origin					100	92,8	100	97,6	100	90,0		100	90,4	84,6	100	89,7	90,0

Table 3 (a-b): vineyards, vocational unit, type of selection of pressing and creation of blend (*effective* wine) in relation to the *affinity judgment* in the year 2002 (3a) and as average of the period 2000-2002 (3b). Data in gray indicate hectoliters of wines not correctly attributed to its original unit.

Vineyard	VU	Variety	Type of selection	3a - *Effective* wine 2002							3b - *Effective* wine (average of the 2000-2002 period)						
				Hl	VU1	VU2	VU3	VU4	VU5	VU6	Hl	VU1	VU2	VU3	VU4	VU5	VU6
Averoldi	1	*Chardonnay*	1	130	130						105	105					
VU1	1	*Chardonnay*	2	16	16						12	12					
Novali	2	*Chardonnay*	1	61		61					54		47		7		
Martore	2	*Chardonnay*	1	50		50					42		42				
Bettolino	2	*Chardonnay*	1	125		125					112		112				
VU2	2	*Chardonnay*	2	61		61					40		35				5
S.Lorenzo	3	*Chardonnay*	1	110			110				87			87			
VU3	3	*Chardonnay*	2	31			31				19			17			2
Caneva	4	*Chardonnay*	1	125				125			109				109		
Corte	4	*Chardonnay*	1	100				100			97				97		
Villa	4	*Chardonnay*	1	92				92			88		10		68		10
Valli	4	*Chardonnay*	1	110				110			119				119		
Rampaneto	4	*Chardonnay*	1	180				180			160				160		
Seradina	4	*Chardonnay*	1	175				175			158				158		
Gazzolo	4	*Chardonnay*	1	80				80			67				67		
VU4	4	*Chardonnay*	2	90	30	30				30	75	10	10	7	31	7	10
Fornaci	5	*Pinot noir*	1	178					178		139					139	
VU5	5	*Pinot noir*	2	35					35		32					32	
VU5	5	*Pinot noir*	3	10					10		13					13	
Favento	6	*Chardonnay*	1	120						120	109						109
Ai prati	6	*Chardonnay*	1	250						250	151						151
VU6	6	*Chardonnay*	2	25			25				25		4	8			13
Total				2154	176	327	166	862	223	400	1813	127	260	119	816	192	300
% of correct origin					82,9	90,8	84,9	100	100	92,5		92,1	90,8	87,3	99,1	96,3	91,0

Table 4: ANOVA applied to the descriptors of wines. Probability of F ratio is reported.

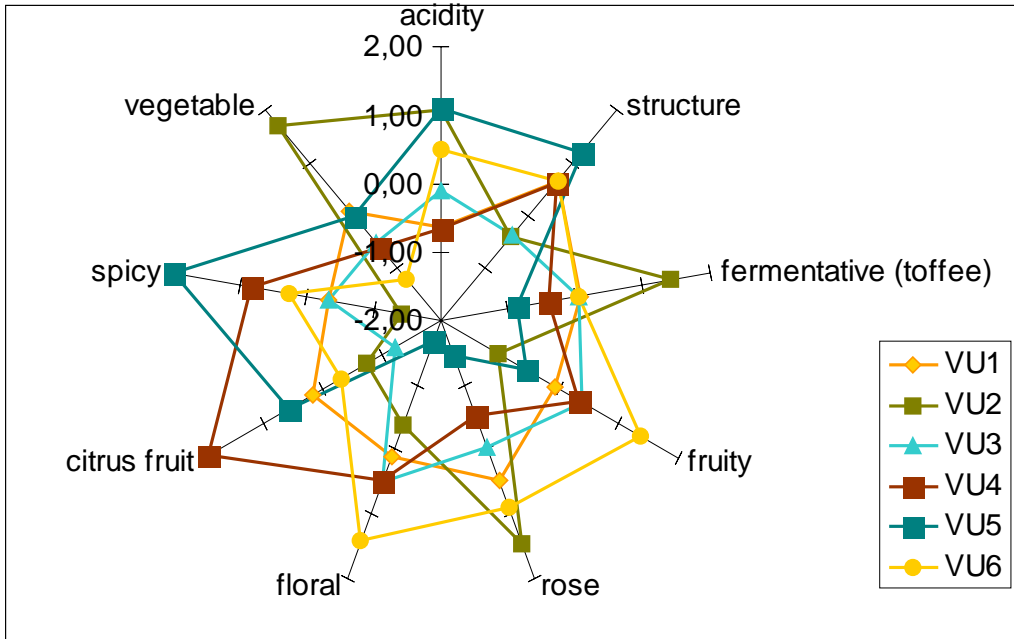| Wine descriptor	*Model*	*Theoretical*	*Effective*
Acidity	0.001	0.227	0.002
Structure (Body)	0.058	0.445	0.059
Fermentative (Toffee)	0.000	0.005	0.000
Fruity	0.000	0.627	0.001
Rose	0.000	0.799	0.000
Floral	0.000	0.244	0.000
Citrus fruits	0.000	0.892	0.000
Spicy	0.000	0.027	0.000
Vegetable	0.000	0.984	0.002

Figure 1: *Model* profiles of the different wines from vocational units.

Figure 2: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 1.
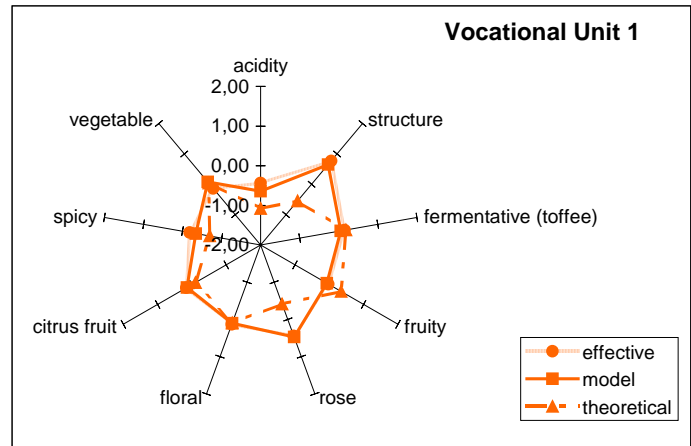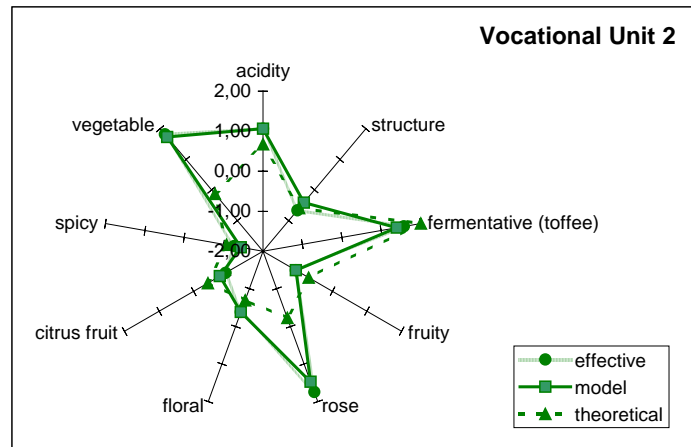

Figure 3: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 2.
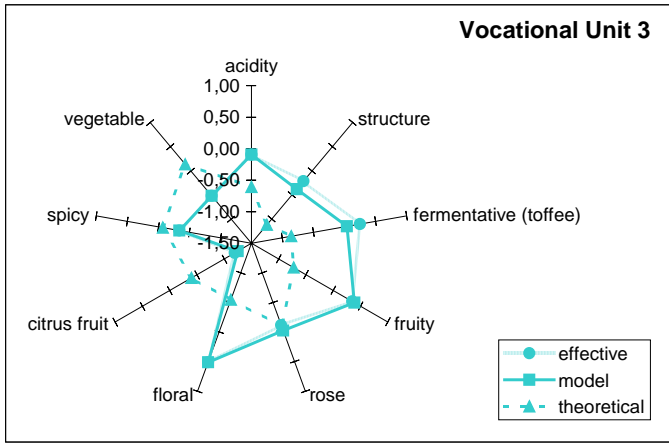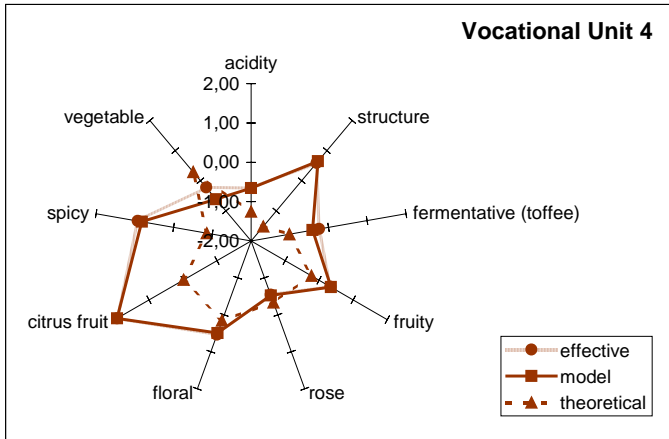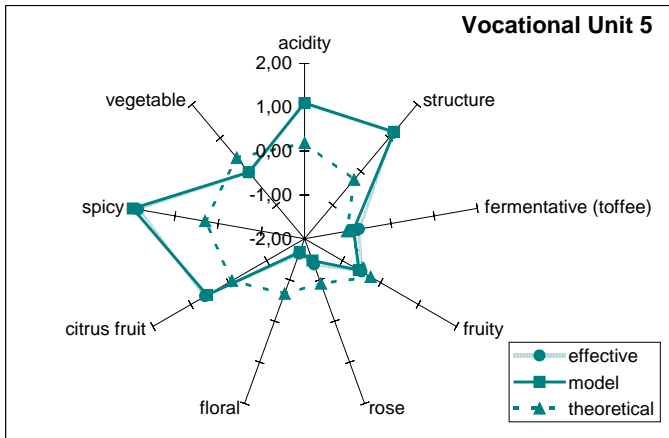
Figure 4: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 3.

Figure 5: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 4.

Figure 6: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 5.
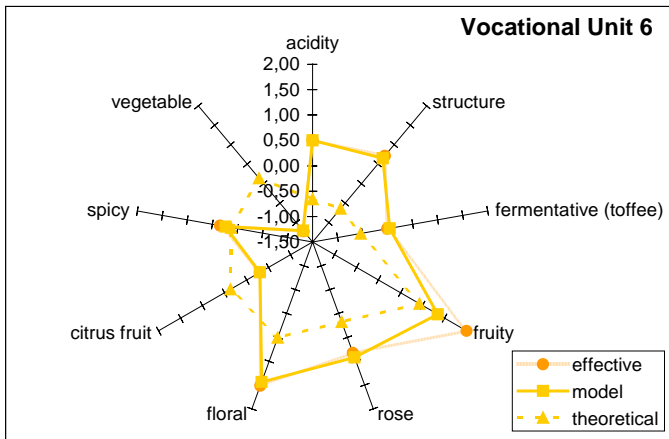

Figure 7: Sensorial profiles of the wines from *model*, *theoretical* and *effective* approaches in the Vocational Unit 6.

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