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Experts versus word-of-mouth in the wine purchasing dynamics: a model from physics

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Abstract

Purpose*: The impact of wine experts, wine critics continue influencing the wine market, bloggers of wine lovers suggest personal judgments and give comments on wines they consume. Our work focuses on the impact of wine expert judgements versus the word-to-mouth effect on the dynamics of wine purchasing behaviour. This process is quite complex, many variables are taken into consideration, and the experts opinions or friends advice could be crucial for a final decision.*
Approach*: We assume the phenomenon is identical to other problems of individual social choices. Therefore, it can be mapped onto a problem of opinion dynamics among agents who have to make a choice about which bottle of wine they are going to buy. To investigate the question we apply the differential version of the Galam model of opinion dynamics, which is developed in the framework of sociophysics (a reaction/diffusion model inspired from the physics of disorder). The model has been used successfully to predict a few outcomes of political events as well as to explain some paradoxical outcomes of public issues.*
Findings*: Application to the wine market provides with a novel understanding on how social interactions and expert judgments affect individual wine purchasing behaviour. We also study the impact of wine reputation in the process of choice dynamic.*
The implications of the practical implementation of these results are discussed. It is found that sample distribution of bottles could be drastically reduced from the usual levels practiced by producers.

Key words: Wine Purchasing, ExpertsImpact, Modeling, Threshold dynamics, Opinion Dynamics

1. SETTING THE PROBLEM

Since 2007, the consumption of wine on the world market remains more or less stable, declining in Europe and slightly increasing in Asia (Plan "Bordeaux demain" 2010). Consumers - neophytes present more than 50% of wine buyers; an average consumer becomes less and less predetermined in its purchase and thus more sensitive to advertising and promotions. Occasional versus traditional wine drinking prevails, and wine companies search for new marketing solutions to attract newcomers and create customers loyalty.

Each consumer has a large choice among thousands of bottles of wines available either on the shelves of supermarkets, or in wine stores or even on numerous Internet wine sites. From 500 to 800 wines are presented on the shelves of each hyper- or super- market store in France. Why are consumers hesitating when they select wines from the shelves? Wine is not the product that consumer can experience or can imagine its intrinsic attributes before the bottle is open. Therefore purchasing wine is not an easy process in front of tremendous of choices that a consumer should make. What do consumers to reduce the risk? Either they tend to repurchase same brand and a bottle of wine which previously brought a satisfaction or they trust the opinion of their friends or they search experts' judgment.

Over the last decade, the impact of wine experts, wine critics as for example e-Robert Parkers guide (http://www.robertparker.com/entrance.aspx) or numerous guides on wine purchasing in France (e.g. http://www.hachette-vins.com), or even simple Internet wine guides (http://www.internetwineguide.com/) continue influencing the world wine market. Specialized journals publish monthly expert reports of wine tasting; Internet sites accompany each bottle with an expert point of view. New technology is put in place in supermarkets to guide a consumer through experts views on the bottles of wines presented on the shelves, bloggers of wine lovers suggest personal judgments and give comments on wines they consume; social wine networks proliferate on the net. The process of wine purchasing is quite complex, many variables are taken into consideration, and the experts opinions or friends advice could be crucial for a final decision. Our work focuses on the impact of wine experts' judgment on wine purchasing behavior. We apply a physical-based model to describe opinion dynamics under social interactions and experts influences.

Each bottle is in competition with a finite population of similar wine products. We assume that each bottle of wine competes only within its own wine range. We consider that each consumer acts and makes decision on favoring one or another wine being located in this specific price range. So, our consumer belongs to a specific set of consumers which could be described for example either using the socio-demographic characteristics (age, gender, occupation, education level, marital status, or monthly income), or using wine consumers segmentation.

It is worth to mention a number of research studies regarding classification of consumers that have been conducted. The groundwork on wine market segmentation, which was published by McKinna (1986, 1987) distinguished connoisseurs, aspirational drinkers, beverage wine consumers, new wine drinkers. Spawton's classification (1991) was based on consumer expectations and risk reduction strategies; he divided consumers by cask and bag-in-the box wine drinkers. Hall & Winchester (1999) added enjoyment-oriented segment instead of new wine drinkers.

Several different approaches have been elaborated for wine market segmentation during the last twenty years (e.g. Orth and Krska, 2002;; Lockshin et al 2010l). In their review of different segmentation approaches, Bruwer, Li, and Reid (2002) classified the consumer group with life style and concluded that wine markets have been segmented based on nine major segmentation variables: quality, consumption, risk reduction, occasion based,

cross-cultural, behavioral, involvement, geographic, wine-related lifestyles. They came up with enjoyment-oriented social wine drinkers, fashion-image oriented wine drinkers, ritual-oriented conspicuous wine enthusiasts, purposeful inconspicuous premium wine drinkers, and basic wine drinkers. A variety of other classifications can be discovered in the wine marketing literature (Julander C.-R. and Söderlund M. 2003; Mueller et al, 2010). Spawton et al (2006) indicated that the wine industry has been subject to all types of segmentation.

Each of these classifications has its own advantages and the focus here is not to compare them or prefer one to another. What is important for us, is the assumption that in each step of social interactions, consumers communicate only with a subset of the one or another consumer segment they belong to rather than with the whole set of wine consumers.

On this basis we investigate the dynamics of choice among a fixed population for which two brands of wine are available, both being equivalent in their content. To address the problem we apply the differential version of the Galam model developed in the framework of sociophysics to study opinion dynamics (Galam et al 1982; Galam and Moscovici, 1991; Bouzdine-Chameeva, 2003; Galam and Jacobs, 2007). Sociophysics is the use of techniques and concepts from statistical physics to tackle social and political problems (Castellano et al 2009; Galam and Vignes, 2005). It is worth to stress that this approach was applied successfully to predict the victory of the No to the 2005 French referendum on the European constitution. It was a highly improbable outcome of a political vote made several months ahead of the actual vote against all predictions of polls and analyses (Galam 2005).

The challenge is to adapt the scheme to the peculiarity of the wine market. As a first step in the process of modeling we restrict the study to the competition of two similar brands. We do not pretend at an exact description of a complicated situation but we aim at enlightening some main stream features, which could be decisive in gaining a substantial market share in a competitive market. It is difficult, almost impossible to predict the wine purchasing behavior of each consumer. And we presume that there is no need to focus on that, there is no need to understand the behavior of each individual in particular, though we must to be able to predict the average behavior and prove it statistically. Another point we address in our model is the prospect of minimizing producer's costs on marketing and promotion. These issues are also embedded in the approach.

2. FROM PHYSICS TO WINE

2.1. Main features

We assume that three effects are competing in the dynamics of choice. The first two are external to the population of agents. One arises from the view of experts who set a hierarchy among the two competing brands denoted respectively A and B. Let us suppose experts view B as better than A. The second is driven by each brand marketing and corresponding commercials. It applies directly to some individuals. The third one is internal and results from the word-of-mouth among the agents. It produces a dynamics which in turn can shift agent preferences toward an attractor at the advantage of either A or B.

The driving dynamics is monitored by the existence of a threshold point located between the two attractors, red wine (wine A) and white wine (wine B) in our case. The flow of the aggregated individual choices follows a constant direction determined by the initial respective shares of A and B with respect of that tipping threshold. To start above the threshold ensures to invade the market at zero additional cost by internal reaction/diffusion among the agents without any external influence. The dynamics of the model is characterized by a local specific update rule among agents in the process of purchasing a bottle of wine of

either one of the two brands, keeping in mind that wine is usually drunk within small groups (see Figure 1).

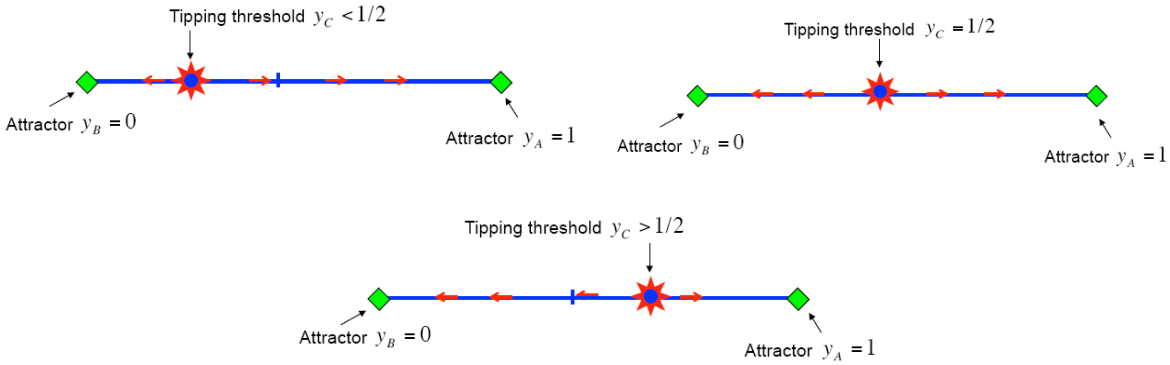

Fig. 1. The dynamics of the model with attractors.

The expert view as well as the past reputation of each brand yield an overall collective belief, which is activated in case agents discussing a bottle choice cannot reach a choice i.e., they are doubting about which brand to purchase. For instance, a group of even size at a tie, Galam model attributes the probability k to the choice of A and (1-k) to the choice of B. Otherwise, when applicable a local majority rule is used for the choice made within the group by all the participating agents. The value of k is a fixed constant susceptible to be modified from varying the external effects, as the experts view or a promotion campaign of one of the brands.

In this paper we focus on interactions by small groups of either three or four agents. A generalization to any size as well as a combination of different sizes is left for a future work.

The results open new and counter intuitive prospective on how to gain advantages in a two brands' competition. In a future follow up work we will introduce the existence of stalwarts, agents who are anchored to one specific brand, either red or white, in other words either A or B. They stay unaffected by whatever influence is applied on them. Using conviviality they will force the group to buy the bottle they want.

2.2. Formalism

We consider a group of N wine drinkers (N is not very small) where N_a is the number of those consumers who like to purchase a red wine produced by the company A which is in a range of prices they have a habit to consume wines. N_b are those consumers who are not convinced that the wine A is worth purchasing and would prefer a white wine which we denote wine B. We thus have the constraint $N_a + N_b = N$.

We start with a simple situation in which the wine interaction model is driven only by a consensual motivation to buy the wine which is appreciated by the majority of the people within each social group. There is no leader, all consumers enjoy tasting wines. We suppose that there is no intrinsic advantage for any member of the groups to favor one wine region or grape variety over another, only individual tastes matter embedded in a consensual spirit.

We assume that the population dynamics of wine appreciation relates to discussions in small groups of agents and can be formalized according to a local majority rule among the present persons. We aim to calculate the probability p_1 to have one initial reference group of R persons to have a majority of people appreciating the particular A wine starting from a whole larger population with a p_0 proportion of the consumers drinking the A wine. All configurations where the number of consumers preferring the A wine is greater or equal to M,

where M= (R+1)/2 for odd and M=R/2 for even values of total group member, add to yield the A wine majority. The case of equality between the numbers of A wine and B wine drinking persons is attributed to A and B wines with respective probabilities k and (1-k) where k is the net result of the various eventually contradictory influences exerted by experts. In this first work we focus on the extreme case where one expert does have a decisive effect, which is quite a common situation in the wine world, in particular with professional sommeliers who advise you on the wine to choose. We make k = 1 as a tip of expert opinion's impact in favor of brand A.

At time t_0 people are grouped by three, and a local majority rule is applied separately within each local group. At time t1 within each group all drinkers who held the minority opinion do shift to the local majority one. Dealing with three agents, the only subtle cases are the ones where two agents sharing the same opinion are against the third, which holds the other one. To follow the dynamics of change in the choice for the A wine, we have studied the y(t) function which describes the evolution of the opinions' proportion, in other words, the proportion of potential consumers (buyers) of the wine A at time t. A detailed analysis of the possible cases, based on a discrete model (see Galam 2005) enables us to write the following differential equation describing this proportion

$$\frac{d}{dt}y(t) = y(t)[-2y(t)^2 + 3y(t) - 1]$$

It is found that the y(t) function produces a monotonic flow towards either one of the two stable fixed points - the one corresponds to the total ignorance of the A wine with the wine B preserving its initial monopoly while the other extreme represents a total invasion of the wine A while the wine B is totally turned out. In between these two points there exists another point which is unstable since it produces the monotonic flow towards either one of the two stable fixed points. It defines the critical density below which the repeated extension in the process leads to the total ignorance of the wine B by this range of consumers.

The two solutions of this equation are the following:

$$y_1(t) = \frac{c_1e^t + \sqrt{-4c_1e + c_1{}^2e^{2t}} - 4}{2(c_1e^t - 4)}; y2(t) = \frac{c_1e^t - \sqrt{-4c_1e^t + c_1{}^2e^{2t}} - 4}{2(c_1e^t - 4)}$$

Only the first solution can fit the reality since the solution must range between 0 and 1. In a case of groups composed of four individuals, a local majority rule is also applied separately within each local group. If at time t_0 people are grouped by 4 agents, then we could write the probability for the new proportion of opinion A in a discrete case following (Galam and Vignes, 2005) and it will bring us to the following differential equation:

$$\frac{d}{dt}y(t) = y(t)[-3y(t)^3 - 8y(t)^2 + 6y(t) - 1]$$

The stationary solutions of this equation (independent of the time, as $\frac{d}{dt}y(t) = 0$ are the following: y= 0, $(5-\sqrt{13})/6$; 1 and $(5+\sqrt{13})/6$. There is only one solution which gets into the range between 0 and 1, and which interests us is : y= $(5-\sqrt{13})/6$ ~ = 0,2324.

There is no analytical solution for this equation, though it can be easily obtained numerically for any initially given value of y(t) at time t_1. The stationary value is attained rather quickly, and could be evaluated as several interactions - we will discuss that more in details below. The first solution can fit the reality since the solution must range between 0 and 1. In a case of groups composed of four individuals, a local majority rule is also applied separately

2.3 Solution and Numerical Analysis

To show the behaviour of the group we need to indicate the initial opinion distribution in a group. The case of a group of three persons is quite simple - the figure 2 below illustrates well the opinion dynamics for different initial values of probability; there are three fixed points : 0, 1/2 and 1. To follow the opinion dynamics change in the density of B wine supporters we need to study the function y(t) defined above.

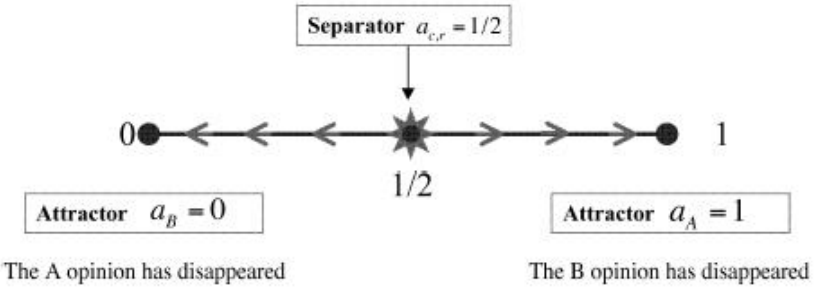

Fig. 2. The initial majority of drinkers is conserved and increased to eventually invade the whole population.

It is found that the renormalized process produces a monotonic flow towards either one of the two stable fixed points $p_{Disappearance}$=0 and $p_{Invasion}$=1. The first one corresponds to the total disappearance of the B brand with A preserving its initial monopoly. At the other extreme, $p_{Invasion}$=1 represents a total B invasion with the A brand totally evicted.

In between these two points (attractors) there exists another one (separator) $p_{Critical}$; which is unstable since it produces the monotonic flow towards either one of the two stable fixed points. It defines the critical density below which the repeated extension in the process leads inexorably to the total disappearance of the B wine brand. The total disappearance of one of the wine brands, A or B, means for us that the winemaker is obliged either to stop producing this wine, or to find another distribution channel, or change the brand name or even to adapt this product to another market segment.

For any odd reference group size it is located at given by $p_{Critical}$=0,5, which gives the threshold to B invasion at exactly 50%. Starting from p_0 < 50% leads towards 0, while the flow leads to 1 for p_0 >50%. Therefore the repeated interaction process leads to the self-elimination of any proportion of an initial B wine brand as long as p_0<50%. To be completed total disappearance only two reference levels are required. Getting closer to the unstable fixed point increases slightly the number of required reference levels of interactions

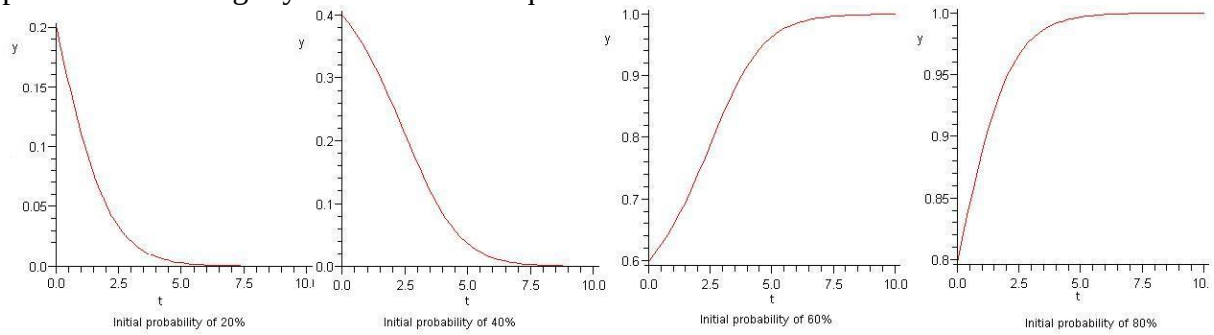

Fig.3. Opinion evolution in a group of 3 individuals.

The case of a group of four persons is definitely more interesting – we have performed the calculation of the opinion dynamics in such a group for different values of the initial probability. In the case of a group of 4 persons we observe an asymmetry in favour of the A wine brand. The two figures below shows the dynamics of opinion evolution for a group with

the initial values of respectively 20% and 30% of persons convinced that the wine of the brand A is a better choice (see Figure 4 and Figure 5).

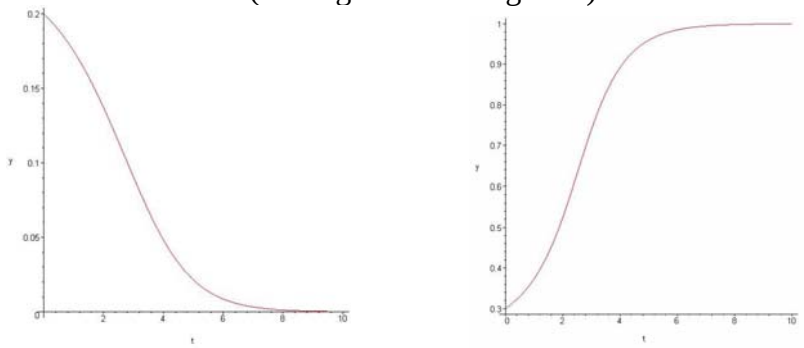

Fig.4 and Fig.5.

The opinion dynamics in a group of 4 persons with 20% and 30% for A respectively

The curves obtained show the difference in the respective evolution of the groups - in a case of 20% persons defending the wine A initially, the interactions in a group bring these 20% to 0% and everyone in a group become convinced that the wine B is a better choice. However a group of four individuals with 30% of opinions favourable for the wine A at the starting point of the discussion comes up with a final assertion of 100% supporters of the wine A; each member of the group is ready to buy the wine of the brand A.

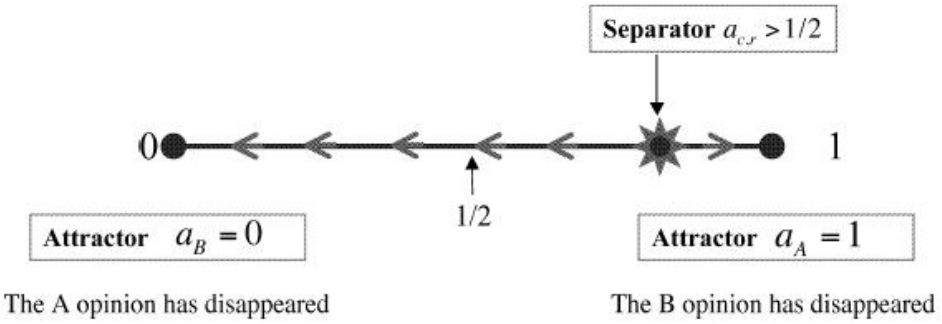

Fig.6. The market with a strong influence of the wine A.

We observe that at the point y= (5-$\sqrt{13}$)/6~ = 0,2324 which describes the 23.3% probability of the initial choice for the wine of the brand A, the opinion dynamics switches radically to a group 100% favourable for the A wine. The exact solution of the equation obtained confirms the existence of this threshold point. Therefore, the 23.3% of persons in the initial group convinced that the wine of the brand A is a best choice will convince all the group in this opinion during the interactions; 76.7% of people will radically change their opinion at no cost for the company only via the word-of-mouth effect (see Fig.7 below) :

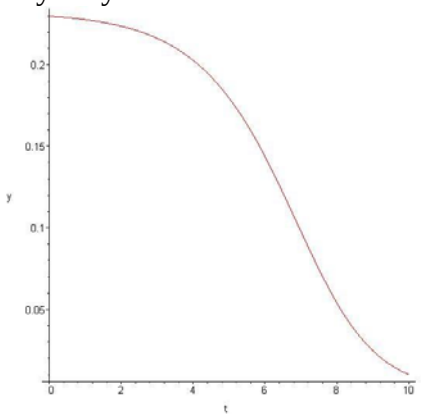

Fig. 7. The opinion dynamics for a group of 4 persons with 23,3% favourable for the wine A.

Starting from a threshold point of the 23.3%, probability leads towards a group with 0% while the flow leads to 100% for any group with the initial favourable attitude towards the wine A higher than 23.3%. This means that to keep on the whole market, the B wine brand must always share more than 77% of the market. Starting from p_0<0,23% leads towards 0 while the flow leads to 1 for p_0>23%:

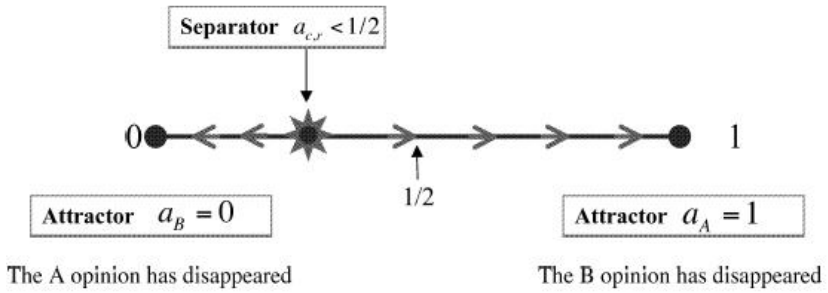

Fig. 8. The possible invasion of the market with the A wine starts at 23,3%

If only one fourth (even a bit less!) of a group (for example, 233 persons in a group of 1000 consumers) is convinced that the wine of the brand A is better than of the brand B, the interactions in small groups of four persons will finally bring to the situation that the whole group (of 1000 consumers) becomes favourable for the A wine, and this happens within a limited period of time.

Performing the analysis for different values of initial proportion of consumers favourable towards the A wine, we have noticed a remarkable feature of the curves - starting at y(0)= 0.25 which means 25% of a group favourable we come up with 53% consumers in favour of the wine A at time t=4 and 74% at time t=5, while starting at y(0)=0.27, which corresponds to the 27% of consumers favourable towards the wine A, more than half of the group - 55%- becomes convinced that the A wine is a better choice at time t=3, and 77% at time t=4. An initial investment of extra 2% (the difference between 25% and 27%) permits to gain the 24% increase of benefits earned for y(t) at time t=4 in our continuous model (see Table 1 below).

Time / Proba	y(t)	t=0	t=1	t=2	t=3	t=4	t=5	t=6	t=7	t=8	t=9	t=10
0.24	y(t) =	0.24	0.24	0.26	0.29	0.35	0.479	0.689	0.865	0.95	0.98	0.993
0.25	y(t) =	0.25	0.26	0.3	0.377	0.53	0.74	0.89	0.96	0.98	0.994	0.998
0.27	y(t) =	0.27	0.3	0.39	0.55	0.77	0.9	0.96	0.987	0.995	0.998	0.999
0.3	y(t) =	0.3	0.37	0.52	0.74	0.89	0.95	0.985	0.994	0.997	0.9997	0.9997

Table 1.The evolution of benefits following opinion dynamics.

Analysing the benefits gained within several small interval ranges we have observed the presence of the two stable fixed points and the intermediate unstable point which flows depending the initial parameters. Here below in the figure 10 we present a comparison of benefits gained for the different values of favourable opinions towards the A wine (moving from 24% to 30%). The curves' behaviour illustrates how quickly the benefits grow even with a small increase of initial favourable opinions in a group.

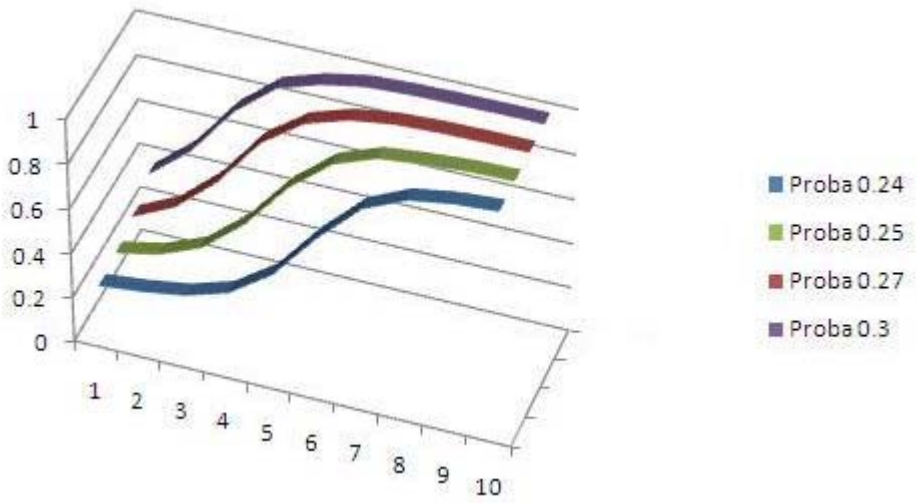

Fig. 10. Comparison of benefits for different values of probabilities

At this stage, the key issue to ensure the wine of brand A monopoly in the considered customers' segment requires an important investment to guarantee stable sales in the market with more than 50% of the population buying the brand B wine. Such a condition put the level of success at an almost impossible task. On this basis we can formulate the following -- for a wine company who wishes to invade the market and assure that a whole set of consumers for whom the wine is available, will choose this wine and not a wine of the company competing in the same market segment, an investment threshold exists, below which investing is useless, no matter what the amount of investment. Investing more is also superfluous.

To ignore the existence of a threshold level can yield to a quite expensive strategy of market penetration for a wine brand. The optimal strategy consists in setting the right level of investment just above the threshold (23.3%) to enable afterwards the full market invasion driven by this process. Reaching a level below the threshold is just a waste of money, on the other hand to pass the threshold is also a waste of money.

3. DISCUSSION OF THE RESULTS

In our model consumers communicate only within a consumer segment they belong to rather than with the whole set of wine consumers. Social interactions contribute into the significant increase of future buyers. On the producer side, the key issue is to ensure a maximum number of consumers favourable towards the wine brand A and ready to purchase this wine, or even come up with a full monopoly of the wine brand A in a particular consumer sector. It certainly requires a significant investment in wine marketing. At this point, the question we attempt to solve is how to get maximum benefits at lowest cost of this investment using social interactions among consumers?

Let us consider a case of a small winery producing 50 000 bottles per year of the A wine, and assuming that the A wine is of good quality, nothing exceptional though correct; as well as the A wine pricing policy issues; quality/price ratio corresponds to the average on the wine market in this range. According to the performed earlier market study, the A wine labels look relatively attractive for this segment of consumers.

To simplify the case, we assume also that a winery sells all wine at the local market and do not use other channels of distribution. Our results are certainly valid for a case with several distributions channels used by a winery.

Expenses on marketing and promotion of this wine are estimated around 5-10% of annual turnover; in our case in terms of the number of bottles of wine, it will be 2500 bottles

for 5%. As all wineries this one uses a practice of setting aside a certain number of free bottles for different promotion activities (like wine tasting, giving bottles to importers, gifts for special honourable guests and visitors, etc) If it is less that 1% of their annual sales (following According to the estimations of several winemakers in Bordeaux region), in our case it will be around 500 bottles. We will suppose that winery has on objective to attain 1000 local consumers per year. On the consumer side in the range of wines comparable to the A wine, the assumption we make is that an average consumer which could be interested to buy the A wine, buys at least one bottle per week. So, during one year a consumer will buy 50 bottles of wine belonging to this range of prices. Our model suggests that it is sufficient for a winery to give 233 bottles for free to 233 consumers which will drink this wine with their friends (another assumption to make is that the chosen 233 consumers have no common friends among themselves, and that their personal social networks have no overlapping).

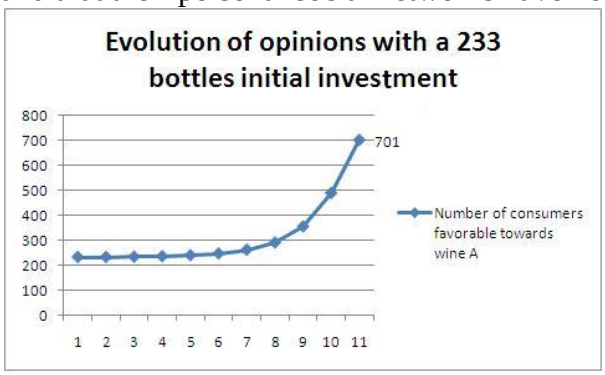

Fig. 11. Evolution of the number of buyers starting with 233 bottles given.

Following the model, within the 10 rounds (t=10) of social interactions 701 consumers become favourable towards the A wine and convinced to purchase it and drink them with their friends too (see Fig. 11). A winery reaches its objective of 1000 customers in 15 rounds (998 customer to be exact). It is important to note that during these 15 rounds the convinced consumers have been alreday buying the wine A at least one bottle per week, by the 15th week, and using the assumprion that each convinced customer buys at least one bottle per week of the wine he likes, there will be almost 40000 bottles sold during that period of 15 weeks (see Table 2 below) .

Time periods	t=0	t=1	t=2	t=3	t=4	t=5	t=6	t=7	t=8	t=9	t=10	t=11	t=12	t=13	t=14	t=15	
# of consumers	233	233	234	236	240	247	262	291	355	489	701	873	952	982	993	998	
# of bottles		1165	1170	1180	1200	1235	1310	1455	1775	2445	3505	4365	4760	4910	4965	4990	40430
																	TOTAL

Table 2. Wine purchasing during the 15 time periods with 233 bottles given for free

Afterwards, the process continues with 1000 customers favourable towards the A wine and in the rest 37 weeks of the year another 36926 bottles will be demanded, the stock of 50000 bottles of a winery will be sold out quickly, in the next 10 weeks. Therefore in 25 weeks in total we come up with the purchase of 50000 bottles available on the market and additional 27356 bottles could be sold till the end of the year to meet the total demand...

Similar results are obtained with an assumption of purchasing a bottle of favoured wine once in 10 days - the wine A will be sold out in 100 days and a 11887 bottles' demand will remain unsatisfied. What the model also suggests is also a significant gain of benefits in case of a very small increase of initial investment. If instead of 233 bottles given for free, a winery gives 250 bottles to 250 consumers, then social interactions brings to the similar result in a period twice shorter than in a case of 233 bottles.

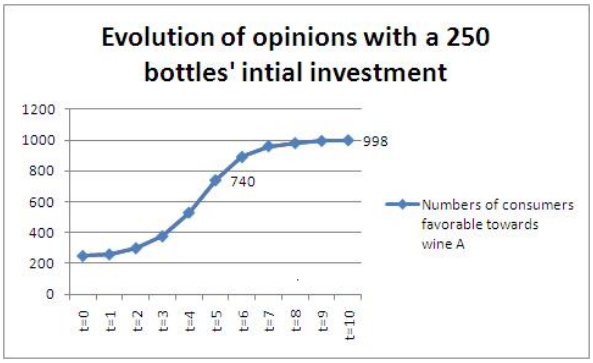

Fig.12. Evolution of the number of buyers starting with 250 bottles given.

Therefore following the model, this observation suggests that increasing the initial investment from 233 to 250 bottles which still remains within the range of 1% of the annual sales of a winery (500 bottles), in ten rounds almost the totality of 1000 consumers (998) are convinced that the brand A is worth buying. With initial assumption of purchasing one bottle per week the wine will be sold out in total in 25 weeks. (see Table 3 below)

Time periods	t=0	t=1	t=2	t=3	t=4	t=5	t=6	t=7	t=8	t=9	t=10	
# of consumers	250	267	302	377	531	747	897	961	985	995	998	
# of bottles		1335	1510	1885	2655	3735	4485	4805	4925	4975	4990	35300
												TOTAL

Table 3. Wine purchasing during the 15 time periods with 250 bottles given for free.

4. CONCLUSIONS AND FUTURE PRACTICAL APPLICATIONS

This paper contributes to a number of fields in a number of ways. First, it contributes to the field of diffusion models and social interactions by suggesting that the continuous version of the Galam model based on differential equations is quite simple, and that computer simulation can contribute well to the real world situation. Up to now only a discrete model of opinion dynamics has been proposed.

Further, it demonstrates the unusual wine marketing investment tool can be put in place by a small winery in order to increase purchasing and invade a particular wine market segment, in which it operates. Third, this study contributes to the field of wine marketing by defining the most beneficial way of using bottles given for free by wineries which exists as a current practice, and by proposing a number of specific constraints for this practice to become a crucial factor of successful sales.

As a first step in modelling the process we have studied the competition between two similar wines in the same consumer market segment. Without pretending at a complete description of a situation we have attempted to enlighten some main stream features, which could be decisive in gaining a substantial market share in a competitive market. Basing our analysis on a diffusion process within small groups, we show that in creating small consumer groups with different social leaders inspired by sommeliers, a winery enables consumers to follow the majority of a group and relatively quickly a whole segment of customers becomes convinced in the qualities of a particular wine after wine tasting or diner.

It is known that wine companies practice bottles for free, however the model suggests how to get a bigger profit of the same amount of bottles given for free and describes the process of several stages to put in place. The current model considers the communication in small groups before purchasing. We have evidences form small producers that one the new marketing tools they put on place as a system of specially organized wine tasting dinners among friends concluding by purchasing.

The process we propose, which will bring to a high percentage of repurchasing; in a particular case of a winery producing 50000 bottles per year, the stock could be sold in 25 weeks with only 233 bottles given free under specific conditions (each person should drink this wine with friends; the chosen 233 consumers have no common friends among themselves, and that their personal social networks have no overlapping). For those companies who are cautious about this practice, the advice is to put it in place as it is not costly (250 bottles for free represents less than 0.5% of annual sales for the considered winery, and this brings 50000 bottles purchased in 10 weeks (250 000 bottles per year!) The ROI is high while the investment itself is not heavy. Nevertheless it is important to keep in mind that the repurchasing process takes time and that it is important to follow the rule of small groups' interactions.

We suggest a direction of possible practical applications that combines the fruit of model analysis, computational studies and real-world practices of wineries. It contends that it is vital to perform wine tasting in small groups: 100 groups of 4 persons is more beneficial than 400 people at once. The diffusion of information between groups is crucial; therefore the interaction among groups should be favoured.

We have defined a simple procedure which allows a winery to increase the number of loyal customers based on social interactions; this process can help increasing sales and move to a particular wine segment invasion. The choice of the initial set of adept consumers (23%) who will launch the process and work with other consumers to convince them in further purchasing is certainly of importance for a winery; sommeliers and commercial representatives of wine companies can be of help in this process.

It is hoped that this work revitalizes the potential complementary relationship between current marketing practices of wineries which, in our view, has been exploited far too sparsely in the fields of strategic wine management in SMEs. In a future follow up work we will introduce the existence of stalwarts, agents who are anchored to one specific wine brand, either A or B. They stay unaffected by whatever influence is applied on them. Using conviviality they will force the group to buy the bottle they want. In this paper we have considered only discussions and interactions without external influence on the group and on consumers. We plan to explore the impact of the external influence (newsletters of producers, information on promotion prices and advertising; e-mail interactions, facebook discussions, etc.) in the follow up work.

REFERENCES

- Bouzdine- Chameeva T. (2003) " The emergence of a shared vision in a group decision-making process: modelling based on a phase transition approach ", *Recherche LAREMA*, Bordeaux -- Ecole de Management, November 2003, 24p.
- Bruwer, J., Li, E. and Reid, M. (2002), "Segmentation of the Australian wine market using a wine-related lifestyle approach", *Journal of Wine Research*, Vol.13 No. 3, pp. 217-242.
- Castellano C., S. Fortunato and V. Loreto (2009), "Statistical physics of social dynamics", *Rev. Mod. Phys*. 81, pp.591-646.
- Galam G., Y. Gefen, and Y. Shapir (1982), "A mean behavior model for the process of strike", Math. J. Sociol., 9, pp.1-13.
- Galam G., S. Moscovici (1991), "Towards a theory of collective phenomena: Consensus and attitude changes in groups", *Eur. J. Soc. Psychol*., 21, 49—74.
- Galam G. , Jacobs F (2007), "The role of inflexible minorities in the breaking of democratic opinion dynamics", Physica A *381*, pp.366—376.

- Galam S. (2005), "Heterogeneous beliefs, segregation, and extremism in the making of public opinions", *Phys. Rev*. E 71, 046123-1-5.
- Galam S., Vignes A. (2005) "Fashion, novelty and optimality: an application form Physics", *Phisica A*, 351, pp. 605 -619.
- Hall, J. and Winchester, M.K. (1999) "An empirical confirmation of segments in the Australian wine market", *International Journal of Wine Marketing*, Vol 11(1), 19-35.
- Hall, J., and Winchester, M.K. (2001), "Empirical analysis of Spawton's 1991 segments in the Australian wine market", *Asia Pacific Advances in Consumer Research*, Vol 4, pp 319- 327 20.
- Julander C.-R. and Söderlund M. (2003), "Effects of Switching Barriers on Satisfaction, Repurchase Intentions and Attitudinal Loyalty" , SSE/EFI Working Paper Series in Business Administration. No.1.
- Lockshin, L. Mueller, S., and Louviere, J. (2010), 'What you see may not be what you get: Asking consumers what matters may not reflect what they choose', Marketing Letters, 21: (November), 335-350..
- McKinna D. (1986), "Attitudes, Behaviours, Perceptions and Knowledge with Respect to South Australian Wine, A report on a qualitative and quantitative research program", Melbourne: David McKinna et al. Pty. Ltd.
- McKinna, D. (1987), "Developing marketing strategies for wines", Paper presented at the Grapes and Wine - The Business End, Melbourne, Australia.
- Mueller, S., Lockshin, L., Saltman, Y. and Blanford, J. (2010), 'Message on a bottle: the relative influence of wine back label information on wine choice', *Food Quality and Preference*, Vol. 21, 22-32.
- Orth, U. R. and Krska, P. (2002), "Quality signals in wine marketing: The role of exhibition awards", *International Food and Agribusiness Management Review*, Vol.4, pp. 385-397.
- Plan "Bordeaux Demain" (2010). Accessed July, 2010. From www.lafranceagricole.fr/.../2010..
- Spawton A. (1991), "Of wine and live access: An introduction to wine economy and state of wine marketing", *European Journal of Wine Marketing*, Vol.25 No. 3, pp. 1-48.
- Spawton, A.L. Romaniuk, J. and Lockshin, L. (2006). Word of mouth and advertising effects on wine brand buying. Paper presented at the ANZMAC Conference. Available at: http://smib.vuw.ac.nz:8081/www/ANZMAC2006/documents/spawton_tony.pdf