

Corporate Governance and Agri-Food Innovation: Empirical Study of Algeria's Beverage Sector

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Abstract - Our research paper sheds light on the effect of selected mechanisms of corporate governance of food companies on its innovation level. The study is conducted on a sample of firms in a segment of the beverage sector in Algeria, studying the influence of the ownership structure (forms, nature, the commitment of owners and the Board of Directors, as constituent elements) and the cognitive ability of the entrepreneur's to innovate. In this research, we deploy an empirical method using two kinds of modeling for the determinants of innovation. The results show that the variables of the food corporate governance have a significant and specific impact on its ability to innovate.

Index Terms *Corporate Governance, Innovation, Food and Beverage Sector, Algeria.*

I. INTRODUCTION

The purpose of our research paper is searching for the origin of the variability in the degree of business innovation in the food industry. We highlight the role of organization's forms of the firm, in its different internal dimensions, on its ability to innovate. The relationship between governance and innovation has become a main topic namely good governance practices, particularly for the corporations, leading to appropriate changes.

The modern economic theories emphasize the central concept of change which innovation benefited an important part. The debate is based on the concept of technology, where technology is a variable that consistently affects the entire economic system. Its contents and its determinants are not explicit [1].

The starting point of our work is based on the inevitable Schumpeterian conception which states that innovations in economy are not, in general, the result of the fact that appear first in the new consumer needs, including pressure changes, the orientation of the production apparatus, but that production is somewhat related to the reduction of consumers and generates new needs, so that the initiative is on his side [2].

The pace of change in the agrifood sector in Algeria has been crucial for the last decade, marked by the relative openness of the market, the implementation of Multinational Firms, and the disengagement of the state monopoly. The beverage industry is a representative of the plan according the

APAB's reports¹. The results of the study show that the variables of the food corporate governance have a significant and specific impact on its ability to innovate.

This article is structured in three sections. In the first section, we present a review of the literature related to the advanced hypotheses. The second section is devoted to the presentation of the research methodology. The purpose of the third one will focus on the empirical analysis of the results.

II. LITERATURE REVIEW RELATED TO HYPOTHESES: ON CORPORATE GOVERNANCE AND INNOVATION LINKAGES

The principal question of this study is to embark on a search for economic determinants of innovation in a food company. In order to avoid any confusion in terms of analysis on this subject, we try to limit ourselves to a narrow set of variables. These variables must be under a unified theoretical basis and relatively consistent.

Indeed, theories of corporate governance seem to us an appropriate analytical framework for examining the effect of governance mechanisms on the firm's innovation level. Considering this context, various internal and external control mechanisms can intervene to force the manager to manage the company in accordance with the interests of shareholders and influence their behavior in making strategic decisions in the company, as the investment in R&D, in order to enhance shareholder's value [3] [4].

Some recent studies focus on the impact of various mechanisms of corporate governance on the innovation level [5] [6] [7] [8] [9] [10] [11]. They highlight the relationship between corporate governance and innovation ability by different methodologies.

In fact, we develop our research question in relation to the assumption that the internal organization of the firm is required to support innovation [12] [13]. Therefore defining the principles of corporate governance which can stimulate this process, become an important debate [7] [8].

Therefore, in order to perfect our problematic search, the quality of corporate governance system should be a favorable

¹ Association of Algerian Beverage Producers

factor of the excellence. The question obviously arises is, what are the effects of different internal corporate governance mechanisms on the innovation level?

In our study of the effect of internal corporate governance mechanisms on the behavior of agribusiness firms, we will look at four internal control mechanisms, namely ownership form [and the Board administration for those that have], its nature, commitments and cognitive ability of the entrepreneur. The size of the company and its performance are also highlighted. We suggest five hypotheses as following.

Hypothesis 1. The ownership structure affects the innovation level in food firm.

Regarding the effect of ownership structure on the level of innovation, the relationship requires a conflicting thesis. We support the positive relationship that may exist for modelling in context.

The concentration of ownership is a guarantee of effective control of management by shareholders [14] [15] [16]. Indeed, the majority of shareholders [holding large shares] have an interest to invest in the control of the firm reducing the risk of discretionary behavior of the managers. Thus, Hill and Snell confirmed also the existence of a positive and significant relationship between the level of R&D and the concentration of ownership [17]. These results show that dominant shareholders are encouraged to control the decisions of managers in order to promote the long-term performance of the company [18].

Holmström argues that the larger firms have the incentive to increase costs in the principal-agent relationship [11]. In particular, the contract costs associated with innovative activity are especially high because of the long-term nature of the risk and innovation. This implies that large firms conduct innovation activities encountering more difficulties as the small firms, because they should manage heterogeneous sets of easily measurable tasks.

The agency theory predicts that the dispersed ownership negatively affects innovation in the firm because it facilitates managers to pursue their own goals. Indeed, as soon as the costs of control exceed profits, small dispersed shareholders will have no incentive to monitor managerial behavior [18] [19] [20].

Hypothesis 2. The nature of ownership affects the innovation level in food firm.

Concerning the effect of the nature of the ownership on the level of innovation, it also requires relatively ambiguous thesis. We support a positive relationship that may exist in our study.

The nature of the ownership refers to the identity of the shareholders of the firm. As a typology, we include public ownership, individual ownership, managerial ownership, and the familial ownership. Williamson explains that the choice of financing depends on the specificity of assets [21]. Debt

should be non-specific assets and the issuance of shares to specific assets.

However, the results of Cheriau show that the participation of institutional investors in the capital has a negative effect on spending in R&D [22] where Zahra showed it when it comes to the short-term [23].

This can be explained by the argument that self-financing or the issuance of shares are better suited to specific assets, while debt will be adequate to finance traditional assets [4]. Otherwise, as stated by Aoki, the institutional shareholders and other owners will tend to have a long-term view [24] [25].

In this view, the shareholder is considered not only as a provider of financial resources but also as a provider of skills and knowledge [26] [27]. Indeed, the shareholder could take both a financial function and a cognitive function and thus can positively influence the development of innovative activities.

Hypothesis 3. The cognitive ability of the entrepreneur has a positive effect on the innovation level in food firm.

In a cognitive perspective, we take a part of the cognitive theories of corporate governance. Cognitive ability is referred to the experience of the shareholders and firm managers. Generally, it is the role of the cognitive ability of decision-makers influencing the learning process and innovative activity of the firms.

Foray emphasizes the important role played by knowledge and learning in the creation and development of innovation activities [28]. On this point, Charreaux argues that the cognitive role of the shareholder has been obscured in the classical theories of corporate governance [26].

Therefore, the dynamic vision lies with relating past innovations of firms and their current ability to innovate is also necessary because of the cumulative nature of knowledge [29].

Hypothesis 4. The firm size has a positive effect on the innovation level.

Fourth, another argument often quite ambiguous requires numerous studies that deal with very different views without having credible results. The famous relationship between the firm size and the innovation level. It seems to us necessary to highlight this relationship in our study to learn more about the issue of the optimality of the size of the firm in our subject.

In fact, this question has given rise to an abundant literature for modern economic theory, but despite its sensitivity, it is not possible to identify a common acceptance. Schumpeter stated that small businesses are more likely to innovate [2]. He returned to this statement by adding that large monopolistic firms are more likely to innovate because they fund research focused on innovation with their monopoly profits [30].

Cohen and al. refuting some Schumpeterian assumptions showed that given size, the relationship is neutral due to the involvement of other characteristics of an industry [31]. While Cohen and Klepper also shows in the same vein that large

firms are engaged in incremental R&D projects who enroll in the pursuit of their competitive advantages to promote their search for economies of scale [32].

Hypothesis 5. The performance has a positive effect on the innovation level.

At the end and as a final hypothesis, the relationship between the performance and the innovation level has often been attributed to the innovative business leaders and the challengers who appropriate the monopoly profits.

If innovation is driven by the performance and market dominance, small business, being follower relatively less efficient, is able to innovate. If innovation is a source of performance, small business would be more motivated to innovate.

All depend on the measuring elements of the business environment and the nature of the technology. As Grossman and Helpman mentioned that a successful innovator devises an input that is more productive than the similar input of earlier generations. If the country's patent system effectively protects the innovator's property rights over this new invention, the innovator will have the exclusive right to produce the new product [33]. However, it is also affirmed that the innovative activity has a positive effect on performance [34] [35].

III. THE BASIC MODEL

Due to the enormous size of the target population for the food firms and its diversity, we will in the first time, precede a selective sampling. Through this type of sampling, we select a specific and narrow range of food firms based on some parameters. The selection procedure as following: By choosing the beverage sector from the total Algerian agrifood business, reduced on 458 operational companies. We have to choose the soft-drink subsector, which will reduced on 322 one. Moreover, by choosing the most industrialized regions², we obtain 162 firms. Our selected ones represent 27.1% of the most representative ones.

The information is required by administrating a questions formula³. Our model contains a large number of variables. The basic version is as follows:

$$Y_j = \beta X_i + \varepsilon_{ij}$$

Modeling the relation is established under two types of regressions. We use the binary Logit and Tobit models. This is consistent with the nature of the variables. Where, Y the dependent variable which reflects the innovation level containing two measures, where:

$$Y_j \ni \{Y_1, Y_2\}$$

² Four regions, companies from Algiers, Blida, Bejaia and Setif.

³ Questionnaire, by direct interviewing (16 company) ; by e-mailing (28 company)

Where X_i is the independent variable, which reflects the main measures of corporate governance (ownership and cognition) and some other parameters of organizational architecture (size and financial performance). Their details are in Appendix [1]. We will analyze the degree of influence of each variable by their adjacent tests.

IV. ECONOMETRIC ANALYSIS

To analyze the capacity of innovation for a company in our case, we test empirically our two equations. At first, we check the formula, which brought out the influence of the determinants of innovation activity Y_1 . The regression model gives us the Gretl's output as following:

TABLE I.

LOGIT MODEL FOR THE 44 OBSERVATIONS WITH DEPENDANT VARIABLE Y_1
 (QML STANDARD DEVIATION)

	Coefficient	Std Error	z	p-value	
x1	-.12048	.029001	-4.1546	.00003	***
x2	-.56743	1.062910	-.5338	.59345	
x3	-.20258	1.471030	-.1377	.89047	
x4	-.13011	.451577	-.2881	.77324	
x5	1.27555	1.488770	.8568	.39157	
x6	-.13516	.046515	-2.9058	.00366	***
x7	.180696	.301149	.6000	.54849	
x8	2.0515e-09	8.2402e-010	2.4896	.01279	**
x9	.0155035	.0280212	.5533	.58007	
x10	1.1852e-09	4.38514e-09	.2703	.78694	
x11	.544521	.141714	3.8424	.00012	***
Aver. for Dep. Var.		.431818	Std Dev. for Dep. Var.	.501056	
R2 McFadden		.721093	R2 Adjusted	.355501	
Number of predicted cases = 41 [93.2%]					
f(beta'x) for the average of independent = .501					
Likelihood ratio test: Khi-2 [11] = 43.3927 [.0000]					

All variables taken together gives us a model with a high correlation [R= .72], and a high degree of significance.

The five measures of the ownership seem to have a considerable influence. The most influential variable (x_1) is the ownership concentration. It shows a very strong negative influence, including his influence with an error of 2.9. The negative effect observed leads us to conclude that more ownership of the business is concentrated, the less innovative.

The variable x_3 , about the owner's engagement inside their firms, have a negative effect on innovation activity. That is to say, the owner engagement can hurt the innovative activity. In other words, the presence of the owner hinders the innovation activity of their firms.

The variable x_5 , about the size of the board has a very negative effect meaning. In addition, the variable x_6 on the

managerial ownership also has an influence. It shows a positive effect. So that the firm is innovative in the food sector, it must have a rate of capital for their managers.

Cognition, on its part, has a positive influence on innovation activity, particularly the experience (x_7). The two variables of the firm size (sales and employees) also are decisive. They have positive effects, confirming that: The larger the company, the more it is innovative. The performance variables, in turn, also show their influence on the speed. The variable x_{16} , reflecting returns, proves the most decisive. This leads us to say that, obviously, to access the high innovation capacity, the firm should provide better performance in terms of return rate.

In the second place, we present the determinants of innovation in relation to the speed of innovation (Y_2) by checking another formula. We conduct a Tobit regression by Gretl, which gives the model below:

TABLE II.
 TOBIT MODEL, FOR THE 44 OBSERVATIONS WITH DEPENDANT VARIABLE Y_2
 (STANDARD DEVIATIONS BASED ON THE HESSIAN MATRIX)

	Coefficient	Std Error	z	p-value	
const	1.703240	.491067	3.4684	.00052	***
x1	-.013338	.004106	-3.2485	.00116	***
x2	.338919	.273061	1.2412	.21454	
x3	-.214729	.303522	-.7075	.47928	
x4	.693754	.421296	1.6467	.09962	*
x5	-.040245	.070973	-.5670	.57068	
x6	-.009780	.004383	-2.2314	.0256	**
x7	-.050853	.008207	-6.1959	<.00001	***
x8	2.05e-10	1.7708e-10	1.1628	.24491	
x9	.0032659	.001274	2.5630	.01038	**
x10	6.8813e-10	1.4119e-09	.4874	.62601	
Khi-2 [11]	97.22547	p-value	6.32e-16		
Max likelihood	-48.00446	Akaike Criteria	122.008		
Schwarz Criteria	145.2034	Hannan-Quinn	13.6106		
Sigma = .720415 [.07679]					
Null Hypothesis. The error is distributed : The normal distribution					
Khi-2 [2] = 19.8142 with p-value = 4.98209e-005					

We can see that, taken together, the determinants of the innovation's rates for the target firms have a considerable influence. This model presents a high correlation and significance. Therefore, the determinants of the rate of innovation for firms are summarized as follows:

Ownership seems to have also in this case a considerable influence. There are two very influential, its concentration, and its nature. Variable x_1 , the ownership concentration, keeps a negative effect. A concentrated ownership slows the pace of innovation. So a little more dispersion is positively correlated with a rate of innovation, taking into account its relative influence with an error of 0.4.

The variable x_2 , the ownership nature, in turn, has a strong influence on the rate of innovation, which further confirms our hypothesis. The variable x_3 , the owner engagement in his company, has a negative effect on the rate of innovation. The longer the owner is involved in the business, particularly in the innovation process, the less speed is slowed. Therefore, a high-speed innovation called for a greater degree of decentralization of innovation decisions.

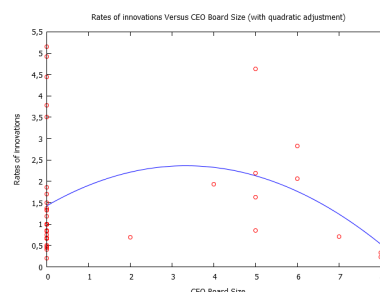
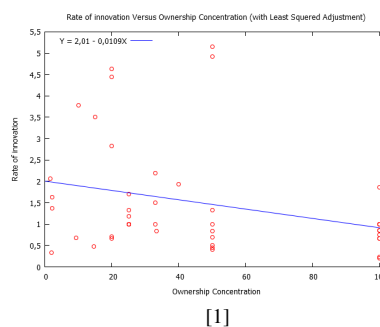
The variable x_4 , the managerial ownership dummy, which also has its share of influence. It shows a positive effect on the rate of innovation, being an incentive scheme. Therefore, for a higher speed of food innovation, the company must pass a portion of its capital to their managers for more delegation of decision-making in innovation. The variable x_5 , the size of the board here has a meaning that has a very negative effect. This goes implicitly with the previous dummy.

Cognition, on its part, has an influence on the rate of innovation despite the variable x_7 on the experience of the firm, shows a negative effect due to its dependence on the dependent variable. This obviously and the only confirms that firms created in the last two decades show a high rate of innovation due to changes in the environment of the target firms.

The variables in the firm size in his two measures are very critical. They have a positive impact on the speed of innovation, particularly in x_9 . Confirming that the larger the firm, the more it will speed innovation.

The performance variables, in turn, also show their influence on the speed. The variable x_{11} reflecting returns rates proves the most decisive. This leads us to say that, obviously, to have a high rate of innovation, the firm should provide better performance in terms of return rates.

To get the influence's directions, the graphics in Fig. 1 below shows the effect of a certain measure of corporate governance dummies on the speed of innovation. The effects shown in the graphs are often non-linear. The first, figure 1 shows the effect of the concentration of ownership of the company on the speed of innovation. This effect is clearly negative, the high speed of innovation is in firms with less concentrated ownership. The second, figure 2 shows the effect of the board size, it shows a non-linear negative effect.



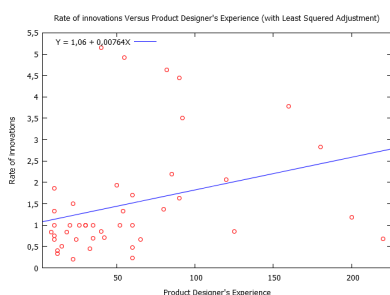
[2]

Fig. 1. The effect of the ownership concentration and the CEO board size on the speed of innovation

One of the characteristics of a board of a food firms, in our context, is that the control of the managers is direct and the disciplinary role of the Board is limited [35]. Hence, the negative effect on innovation, which it manifests an optimal size. Consequently, the ownership nature has also being that managerial ownership positively affects the speed of innovation. Therefore, a board of optimal size with the participation of some decision-makers is an incentive scheme would have a positive effect on the rate of innovation.

Cognitive capacity, obviously, as shown in figure 3 and 4, have a positive effect. More business requires a high cognitive ability, it becomes more innovative, due to the experience's effect. The figure 4 can be explained by the fact that changes in the business environment over the last decade, they have stimulated the process of agrifood innovation.

[3]



[4]

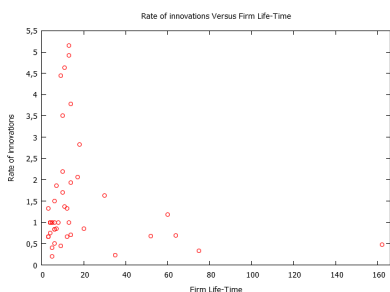


Fig. 2. The effect of the cognitive ability on the speed of innovation

Other graphic representations [in Appendix 2] illustrate the effects of the organizational architecture's variables on the rate of innovation. The effects are often non-linear as confirming our hypothesis. The size of the business turnover shows optimality, therefore, neither too small nor very large companies that innovate. Optimal size should be held in account to access the high speed of innovation. In terms of number of employees in figure 5, which shows a positive effect, goes either with cognitive ability.

The performance at their side shows a non-linear effect in the figures 7 and 8. However, their influence is significant, those accessing high speed which have optimal performances. The performance is not here a source of innovation, but they are motivated to innovate.

Regarding our analysis, we were able to show different determinants of innovation in the food business. The results of the empirical study of the determinants of food innovation serve to emphasize the importance of key elements of the internal structure of a food firms, in our case the target sector.

V. CONCLUSION

Our research paper aims to expose the influence of the innovation's determinants in food firms, especially those in the soft-drinks industry, focusing on the effect that the internal structure the firm on its innovation level.

We have highlighted the key explanatory variables influence on measures of food innovation. The results of this study, by confirming the largely theoretical predictions showed that indeed the internal structure matters in innovation process. Empirically, advanced hypothesis including some that are implicit assumptions, fit within the predictions of all theories discussed.

APPENDIX

APPENDIX I.

Summary table of used dependent variables

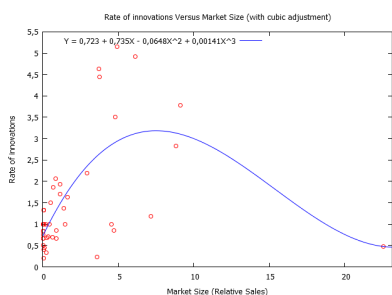
Variables	Symbol	Definition of variable	Measures
Innovation Level Measures	Y1	Innovation activity supported by firms	Dummy variable, 1: if the firm have innovate ; 0 : elsewhere
	Y2	Rate of innovation supported by firms	Total of innovation on firm's life-time
Ownership Structure	x1	Ownership concentration	Capital rate owned
	x2	Ownership nature	Dummy with : 1: for individual owners, 2: family owners; 3: Public ownership
	x3	Owner engagement	Dummy with : 1: Owner engaged ; 0: Owner not engaged
	x4	Managerial Ownership	Dummy with : 1: if manager-owner ; 0: not
	x5	CEO members	The number of CEO
Cognition Ability	x6	Experience of products designers	Quantitative variable with direct imputation of years

	x7	Firm's life-time	Quantitative variable with direct imputation of years
Firm Size	x8	Sales	Quantitative variable with direct imputation of sales
	x9	Workers	Quantitative variable with direct imputation of the workers number
Financial Performance	x10	Net Results	Quantitative variable with direct imputation of the results
	x11	Asset Returns	Quantitative variable with direct imputation of returns

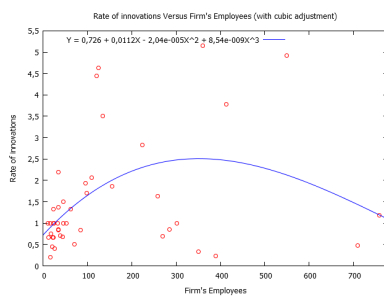
APPENDIX 2.

Graphics for the effects of the firm's size and performance on the rates of innovation

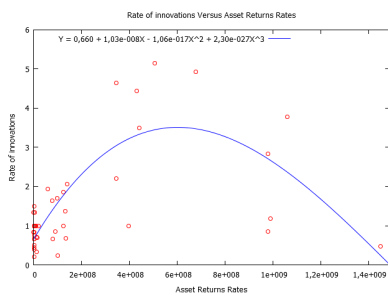
[5]



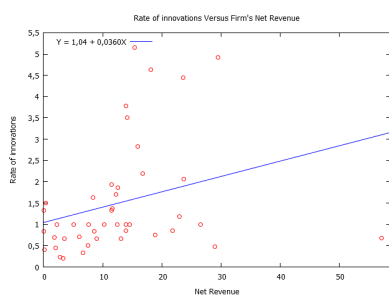
[6]



[7]



[8]



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