Vertical Links in the Dairy Industry as a Response to Dependence on the Raw Material

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الروابط العمودية في صناعة الحليب كاستجابة للتبعية للمواد الخام

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Abstract:

The hardest challenge that dairy industry faced over time, is the scarcity and insufficiency of national raw milk production. That pushed it to count on the powder milk importations. Becoming dependent from this resource, dairy industry has to follow the public policy. Which trying to promote national production,+96 by imposing the vertical integration as a solution. After having described the contribution of the resource dependency theory in the explanation of vertical links in response to the risks engendered by a dependence on a raw material, this can give us an overview of the degree of vertical integration in the dairy industry. Our work aims to study these vertical links in the entire dairy industry in the Bejaia region. Based on the results of a field survey of the local dairy industries. The results of the Pearson correlation's analysis obtained revealed a strong statistical interdependence between the variables, which demonstrates the strength of the vertical links that explain a significant degree of vertical integration for the entire dairy industry.

Keywords: Resource dependency theory؛ Vertical links؛ Dairy industry؛ Vertical integration؛ Correlation.

(JEL) Classification: L22; C83

الملخص:

التحدي الأصعب الذي واجهته صناعة الحليب بمرور الوقت هو ندرة وعدم كفاية إنتاج الحليب الخام الوطني، مما دفعها إلى الاعتماد على واردات الحليب المجفف. بالاعتماد على هذا المورد ، يتعين على هذه الصناعة اتباع السياسة العامة التي تحاول تعزيز الإنتاج الوطني من خلال فرض التكامل الرأسي كحل. بعد وصف مساهمة نظرية التبعية للموارد في شرح الروابط الرأسية استجابة للمخاطر الناتجة عن الاعتماد على مادة خام، يمكن أن يعطينا ذلك نظرة عامة على درجة التكامل الرأسي في صناعة الحليب، ويهدف عملنا لدراسة هذه الروابط الرأسية في صناعة الحليب بأكملها في منطقة بجاية ، بناءً على نتائج مسح ميداني لصناعات الحليب المحلية. كشفت نتائج تحليل ارتباط Pearson التي تم الحصول عليها عن ارتباط إحصائي قوي بين المتغيرات، مما يوضح قوة الروابط الرأسية التي تفسر درجة كبيرة من التكامل الرأسي لصناعة الحليب.

الكلمات المفتاحية: نظرية التبعية للموارد؛ روابط عمودية؛ صناعة الحليب؛ التكامل الرأسي؛ علاقة مترابطة.

الترميز الاقتصادي (JEL): L22; C83

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I. Introduction:

Algerian dairy industry has faced, since independence, the challenges of supply and dependence on raw material (raw milk and / imported milk powder). Scarcity and insufficiency of national raw milk production has made these industries dependent on imported milk powder. This prompted the government to invest in policies to promote and encourage national raw milk production.

Resource dependence theory is one of the economic theories that explains vertical links complexity which are created in response to risks engendered by dependence on a resource. Among the risks facing industries, resource dependency theory defines uncertainty and interdependence. These risks also represent characteristics of external environment in which an industry operates; over whose it has no control, and they always force it to look for new strategies to ensure supply.

Bejaia is a region where dairy industry is very developed, it counts two big firms and many dynamic small and medium-sized enterprises (SMEs). Here, we taken the seven industries engaged in the policy of promote local raw milk production. There are many variables may be determining vertical links, as supplier's number, dairy's cow number, and collected/integrated raw milk quantities ...etc. In perspective of determine vertical links strength, we are interested by this question: How important is the relationship between our different variables? and its impact on vertical relationships? In this work, we will deal with the following assumption: "Relationship between the different variables can demonstrate vertical relationships importance".

In following study, we will first recall resource dependency theory and its links with supply. Next, we will present results of a field survey on Bejaia's dairy industry. We have chosen to analyze vertical links of the entire dairy industry with the Pearson correlation on SPSS 24.

II. Literature review:

1. Characteristics of the external environment

Structural characteristics of the environment can affect the uncertainty of companies when they seek to acquire the necessary resources and consequently the creation of inter-organizational relationships. We have three main characteristics that stand out from the writings of Pfeffer and Salancik 1978 (p.40-42):

- *"*Concentration: the measure that explains the dispersion of power.
- Munificence: is resource's scarcity/plenty in the environment
- Inter-connectivity: Link's structure between organizations."

In economic, concentration has often been one of the best concept describing organizational environments. When in an industry, some companies (between four and eight) take control on the market, we speak about concentration which is represented by a ratio of output or employment. It can also help to reduce the constraints of coordination in social units (Pfeffer, Salancik, 1978). In this situation, the large companies dominate the market, and always have a several relationships because they deal with a big variety of partners upstream or downstream, who may be competitors too (Dowling et al., 1996).

The abundance of resources characterizes the environment in general. However, when we speak of less munificence in it, we have prevalence of scarce resources. Which can lead to a raise in conflicts and interdependence between economic actors. Indeed, the rarity of resources is more important in

"hyper-competitive" markets. Which can increase the organizational interdependence (Dowling et al., 1996).

Interconnectivity is the third important environmental characteristic determining uncertainty (Pfeffer, Salancik, 1978), which is in theory the pattern of links between different organizations in an economic system. The authors observed that interconnection can result from the regulation system because the laws encourage to more of it (Dowling et al., 1996).

2. Resource dependency theory in the institutional approach

For the institutional approach, an organization evolves in a social system composed of norms, rules, values and hypothesis. Where it must impose itself with an appropriate way of behaving in a shared social reality (Hessels, Terjesen, 2010; Oliver, 1997). We can consider institutional management as a process of exchange in which the organization obtains the necessary resources. But must at the same time promise certain predictable behaviors (Pfeffer, 1976).

Decisions are made based on allowable and legal values in a specific environment or "organizational field" which generally develops to common structures and processes. This is due to coercive constraints and normative prospects (Hessels, Terjesen, 2010; DiMaggio, Powell, 1983). Furthermore, the decisions and actions of the organization can be explained according to the situation of particular dependence (Nienhüser, 2008). By accepting and assuming that organizations are endowed with an extraordinary potential for change, resistance, awareness, proactivity, influence and diversity, Institutional theorists are able to study more precisely the strategic aspect of the institutional environment (Oliver, 1991). The organizational responses or choices of managers will vary respectively from conformism, passive, preconscious, powerless, usual to resistant, active, control, influential and opportunist, depending on the institutional pressures exerted on compliance by organizations (Greening, Gray, 1994; Oliver, 1991). The needs of the institutional environment can be met through the identification of the best alternative strategies and the origin of the conceptual basis of this is in the recognition of the potential for variation in dimensions of organizational behavior (Oliver, 1991).

2.1. Resource dependency theory in the institutional approach

Among the theories that study the connection and links in an organizational field, between an organization and the several actors in her environment. We find the theories of resource dependence and institutional. According to their hypotheses, the two consider that the external pressures limit the organizational choice and that organizations seek to enhance their acceptance and legitimacy vis-à-vis external stakeholders (Hessels, Terjesen, 2010; Greening, Gray, 1994). When we use both of then, we have greater prediction ability since the integration of resource dependency arguments and institutional theory contributes. To a better understanding and forecasting of sources of institutional change (Sherer, Lee 2002, p.104), thus, the explanations that the two theories provide, are distinct but complementary (Greening, Gray, 1994; Sherer, Lee 2002).

Resource dependency theory emphasizes a company's need for resources from other environmental actors. Relates to what extent resource shortages dictate innovations to organizations to pursue using alternative resources (Pfeffer, Salancik 1978; Hessels, Terjesen, 2010; Sherer, Lee 2002). Institutional theory, on the other hand, presents the description of the acceptable and legitimate practices adopted by an organization in the framework of its internal organization (Hessels, Terjesen,

2010). Thus, the two theories depict how competitive pressures and other actors in the external environment who influence organizations affect them. But, they don't explain the same way the fact that organizations may be dependent from other actors and be affected by their actions. While the resources dependence theory support that the need for resources explains dependence on other actors, institutional theory presages in the field of the organization that organizations are prone to follow the behavioral values and norms of other actors (Hessels, Terjesen, 2010).

Managing issues represents a strategic adaptation to external pressures and even institutional response (Greening, Gray, 1994). In answer to institutional constraints, an organization may be displayed with the potential for variation in the degree of its choice, influence, self-interest and awareness (Oliver, 1991). Thus, depending on the perspectives of resource dependence and institutional, external pressures limit organizational choice, and in order to survive organizations have to be reactive to external expectations and demands (Greening, Gray, 1994; Oliver, 1991).

While institutional theory emphasizes the environment's material conditions as opposed to social expectations, cultural values and norms; the resource dependency theory seems to be more appropriate given its three main themes (Powell, Rey, 2015, p. 95):

- *"*Organizations are affected by environmental;
- The environmental constraints are managed by organizational efforts;
- The influence of environmental pressures on internal organizational dynamics."

Therefore, resource dependency theory may be the best suited because it emphasizes that for the operation of acquiring essential resources be optimal, environmental elements must be taken into account. This condition is very important and has consequences on the elaboration of successful strategy which adapts efforts to face environmental change and external forces (Powell, Rey, 2015). Furthermore, one of the key factors in the development and planning of organizational strategy is dependence on resources (Greening, Gray, 1994; Oliver, 1991; Powell, Rey, 2015). Indeed, this theory focuses - in its analysis - on the behavioral choices that organizations can take to foil their dependencies, because the organizational (managerial) choice is limited by a several external constraints, and to survive in this environment, organizations have to responses optimally to external expectations (Pfeffer, Salancik, 1978; Oliver, 1991).

2.2. Institutional constraints of organizations

Pfeffer (1976) notes that institutional management function involves managing the organization's relationships with other organizations. In addition, the most common response to interdependence with external organizations. Appears to be the attempt to develop a form of inter-organizational link to ensure the continuation of favorable relationships, with important organizations in the environment. The loss of autonomy of the organization is the most fundamental cost of all these inter-company links. Managing interdependencies is linked to the importance given by the organization to the extent of interdependence. The structure of the industry determinates the response to competitive interdependence, in particular the need and the feasibility of developing informal and inter-organizational structures.

Organizational theory focused, initially, mainly on problems related to administration (decision-making, people management), neglecting the other two levels (technical and institutional) defined by Parsons (Pfeffer, 1976). While managing the organization's relationships with other organizations and actors in its external environment, such as competitors, creditors, suppliers and government entities

is often also essential to the growth of the business. where the importance of the institutional context (Pfeffer, 1976).

Economic theory - in general - and above all of organization - recognizes the importance of the institutional context in which the company operates. It must be admitted that Enterprises are open social systems, engaged in important and constant proceedings with other organizations in the same environment (Pfeffer, Salancik, 1978). Since firms interact with these other organizations, two consequences follow: uncertainty and interdependence (Pfeffer, 1976, p.37).

Uncertainty: If an organization were a closed system allowing it to inspect and prognosticate all the actors and factors that affect its functioning, it could make technically rational decisions, optimize the decisions made and anticipate the results of its actions. As an open system, which deals with a large range of external partners, the company has big difficulties to take control over many of the variables that affect its actions. Since companies are open, they must be suffering by the effects of events outside their environments (Pfeffer, 1976).

Interdependence: Companies depend on other actors and organizations with which they deal and exchange information, resources, or personnel, and are therefore likely to influence. The importance of the resource obtained determinate probably the amplitude of this influence and inversely it is linked to the facility with which the resource can be acquired from alternative sources. Interdependence is problematic and embarrassing. Business leaders do not like to depend on factors beyond their control. Interdependence is particularly troublesome if there are few alternative sources. External organization is therefore particularly important for the company; interdependence is the reason why something does not happen exactly as someone wishes. (Pfeffer, 1976; Pfeffer, Salancik, 1978).

3. Strategies for managing uncertainty and interdependence

Interdependence and uncertainty interact on their effects on organizations. One of the main functions of the institutional level of the enterprise is the management of this interdependence and this uncertainty (Pfeffer, 1976). And the company uses different strategies to deal with it. But they encounter two problems in their institutional relationships (Pfeffer, 1976, p. 38-39; Hillman et al., 2009, p.1405):

- *"Manage the uncertainty caused by the unpredictable actions of competitors;*
- *Manage uncertainties resulting from non-competitive interdependence with suppliers, creditors, government entities and customers."*

In his explanation, Pfeffer (1976) states that in both cases, the same set of strategic responses is available: merging to completely absorb interdependence and resulting uncertainty; joint-ventures; nested directions, to partially absorb interdependence; the movement and selective recruitment of managers and other staff, in order to develop links between organizations; regulation, to provide stability imposed by government; and other political activities aimed at reducing competition, protecting markets and sources of supply, or managing the environment of the organization (Pfeffer, 1976; Hillman et al., 2009). Since organizations are open systems (Pfeffer, Salancik, 1978, p. 43), each strategy has limited effects. Although a merger or other inter-organizational link can manage a source of organizational dependence, it is likely that organizations are at the same time dependent on still other organizations (Pfeffer, 1976). We can consider institutional management as a process of exchange, the organization ensures the necessary resources, but must at the same time promise certain

predictable behaviors (Pfeffer, 1976; Hillman et al., 2009). The operations and decisions of organizations are strongly linked to the conditions of their respective environments, so from an open systems perspective, these organizations try to manage their external dependencies and / or control these environments and this to make them more sumptuous (Pfeffer, 1972).

Resource dependency theory is utilized to explain the extent to which organizations can reduce the interdependence and uncertainty associated with environmental factors. In general, a study based on resource dependency theory is constructed according to five options (Pfeffer, 1976, p. 44; Pfeffer, 1987, p. 40-43; Hillman et al., 2009, p. 1404-1419):

- *"Vertical integration /Mergers,*
- *Inter-organizational relationships /Joint-ventures,*
- *Cooptation within directorate,*
- *Political actions,*
- *The succession of the executive / staff movement."*

These options represent the steps an organization can take to minimize dependence on external environmental factors.

3.1. Resource dependency theory and supply

There is very little and minimal research in the area of resource dependency theory of supply chain management. It is known that attempts to control external interdependencies can have unintended consequences (Pfeffer, 1987), such as new models of dependency. This is illustrated by extensive externalization programs (full service providers) that ameliorate certain operational problems and create new problems, information sharing and cooperation, which are important for successful management, can also be problematic (Pfeffer, 1987, Hillman et al., 2009).

Resource dependence can be seen more as a reflection of strategic externalization than of environmental constraint (Finkelstein, 1997). According to this reasoning, the most appropriate strategy for many companies is to acquire inputs from other companies rather than produce them its self, but insofar as this is true, the traditional explanations of dependence on resources do not distinguish between so-called strategic dependencies (which would not justify an action aimed at reducing constraints because these companies exercise little or no constraints) and environmental constraints. Dependencies (which create constraints on organizational action) may product potentially counterintuitive consequences (Finkelstein, 1997).

3.2. Vertical integration strategy

According to Coase, understanding vertical exchange relationships is the key to understand vertical integration rather than understanding vertical production relationships (Coase, 1937; Perry, 1989). The degree of vertical integration, implying the replacement of the price mechanism, varies considerably from one industry to another and from one company to another (Coase, 1937).

According to Perry (1989, p.185), a company is said to be vertically integrated if it has two single-output production processes in which either:

- All the quantity of the upstream process output is used in whole or in part as an intermediate input in the downstream process.
- All of the downstream process intermediate input is obtained from part or all of the upstream process output.

For Williamson (1973), vertical integration is a process that replaces the purchase of inputs with their production by hiring labor. The degree of vertical integration does not change depending on ownership of the required capital, it could be owned or leased, and leasing can allow the control of production without property (Perry, 1989).

III. Methods and Materials:

Our study is based on a field survey of Bejaia's dairy industry carried out in 2019 (the data used represent the statistics for 2018). Our sample is made up of the seven dairies involved in the national program for rehabilitation of milk sector. It is made up of two large private dairies and five SMEs, one of which is public.

There are six variables involved in the study: raw milk collected quantities, breeder's number, dairy's cows number, manifold's number, raw milk integrated quantities and subsidy amount.

To study the vertical links, in response to dependence on raw milk, we choose the Pearson correlation. Correlation is a measurement of a monotonic combination among two variables, if the value of the first variable rises, so does the value of the other variable (we speak about positive correlation); or if the value of first variable increases, the value of the second variable decreases (we speak about negative correlation) (Schober et al., 2018). A Pearson correlation is a measure of the power for an association among two linear quantitative measurements. Pearson's r was the first formal correlation measure, and it is still the most largely used measurement of relationship, this coefficient r is a dimensionless measure of the covariance, which is scaled such that it ranges from –1 to +1 (Rodgers, Nicewander, 1988). Schober et al., (2018, p.1764) suggest that *"the r coefficient can be calculated as a measure of a linear relationship without any assumptions"*. And they confirm that *"If there is a relationship between jointly normally distributed data, it is always linear"*.

We can summarize the correlation's degree as:

- Perfect correlation: r value is near ± 1.
- Strong correlation: r value lies between ± 0.50 and ± 1.
- Medium correlation: r value lies between ± 0.30 and ± 0.49.
- Small correlation: r value lies below $\pm$ 0.29.
- No or zero correlation: r value = 0.

In this study, Pearson correlation will help us to determine if there is a significance association between the different variables we chosen (integrated quantities, collected quantities, breeder's number, dairy's cows number, Manifold's number, and subsidy amount) for try to measure the strength of the vertical relationship. And before that, we will check the assumption of normality with Shapiro-Wilk test. To run this measures, we will use SPSS 24.

IV. Results and discussion:

1. Variable′s identification

The variables: raw milk collected quantities, breeder's number, dairy's cows number, and manifold's number are measures concerning supply. We can consider breeders and manifolds as suppliers, and dairy's cows number as a determining measure of raw milk collected quantities.

Whereas raw milk integrated quantities and subsidy amount are measures after processing; and they may determine vertical integration degree.

Figures 1, 2, 3 and 4 represent the monthly evolutions in values of the variables studied for year 2018. Raw milk production directly depends on dairy's cows number, and productive dairy cow's numbers also depends on the season. Production peaks are always recorded in spring (March, April and May).

Observing the trends in curves evolution, we noticed that the curves of collected quantities (Figure 3), (Figure 2), and subsidy amount (Figure 4) have similar trends, which suggests a strong interdependence between these variables. While integrated quantities trend (Figure 3) shows a less similar trend than the others, this indicates that interdependence between integrated quantities and the other variables is not direct, but there is another factor determining integrated quantities which is not represented by variables studied here (which is raw milk quality). Variations in the evolution curve of breeder's number (Figure 1) are due to the variations of productive dairy cow's numbers.

2. Checking the data's normality

To verify normality, SPSS performs two different tests: The Shapiro-Wilk and the Kolmogorov-Smirnov tests. To choose between the two, we have to refer to the sample size. Generally speaking, Shapiro-Wilk test is interesting and useful when there are small to medium sample size datasets while Kolmogorov-Smirnov test is preferred when there are larger sample sizes (Vetter, 2017, p.1377-1379). Since our sample is small (seven dairies) so we will refer to Shapiro-Wilks test.

If the significance (P value: Sig) <0.05, then this would indicate that there is no normal distribution for the data. Alternatively, if the significance (P value: Sig) >0.05 in the Shapiro-Wilk test, this would suggest that there is normal distribution for the data.

According to Table 1, the Sig >0.05 for all variables, so the null hypothesis is retained at the 0.05 level of significance. Therefore, our data is normally distributed.

3. Correlation discussion

By measuring statistical correlation, we try to see the strength of vertical links between variables directly; which could give us a view of vertical integration degree in reality for the entire Bejaia's dairy industry.

The statistical correlation measured in Table 2 is significant for all the pairs of variables. We have two cases:

- **Perfect correlation:** A significant correlation at threshold 0.01 which is a very strong (perfect) correlation; where Pearson's r is very close to +1, therefore a positive correlation. This concerns the following pairs of variables: **(a)**: Breeder's number / Collected quantities; **(b)**: Dairy's cows number / Integrated quantities; **(c)**: Dairy's cows number / Collected quantities; **(d)**: Dairy's cows number / Breeder's number; **(e)**: Manifold's number / Breeder's number; **(f)**: Amount of the subsidy / Integrated quantities; **(g)**: Amount of the subsidy / Collected quantities; **(h)**: Amount of the subsidy / Breeder's number; **(i)**: Amount of the subsidy / Manifold's number.
- **Strong correlation:** A significant correlation at the threshold of 0.05 which is a strong correlation, where Pearson's r is between +0.5 and +1, therefore a positive correlation. This concerns the following pairs of variables: **(k)**: Integrated quantities / Collected quantities; **(l)**: Manifold's number / Integrated quantities; **(m)**: Manifold's number / Dairy's cows number; **(n)**: Breeder's number / Integrated quantities; **(o)**: Manifold's number / Collected quantities.

3.1. Correlation's analysis of pairs (d), (e), et (m)

The pairs of variables **(d)**, **(e)**, and **(m)** represent the information about the suppliers and upstream of the production chain. In this case, we recorded a perfect correlation for **(d)** and **(e)** and a strong correlation for **(m)**. In reality, this is true, because the more the breeder's number rises, the dairy's cows number also rises; and the more the breeder's number increases, manifold's number also increases significantly. This is also true for the couple **(m)**, because the more dairy's cows number increases, manifold's number should also increase (if dairy's cows number increases then the quantities of milk will also increase so we will need more milk manifold).

3.2. Correlation's analysis of pairs (a), (b), (c), (l), (n), and (o)

(a) and **(n)** represent the relationship between breeder's number and collected/ integrated quantities. The more breeder's number increases, the more quantities collected increase very considerably, and integrated quantities increase significantly but less considerably; because collected quantities depend directly on breeder's number; whereas the integrated quantities depend above all on the raw milk quality, which makes the correlation less strong.

(b) and **(c)** represent the relationship between dairy's cows number and raw milk collected/ integrated quantities. Pearson's r value = 0.993 for **(c)** is very close to +1, which indicates a perfect positive correlation between dairy's cows number and collected quantities which is very true in reality; because the more dairy cows we have, the more milk production increases, the more collected quantities increase.

The Pearson's r value = 0.882 for **(b)** is very close to +1 but slightly less than the Pearson's r value for **(c)**. In reality, this also indicates a perfect correlation between dairy's cows number and the integrated raw milk quantities, but we also know that the integrated quantities depend on the produced quantities and the quality of the milk. Therefore, an increase in dairy's cows number generates an increase in integrated quantities but less significant than that of the collected quantities.

(l) and **(o)** represent the relationship between manifold's number and collected/ integrated quantities. The Pearson's r value = 0.838 for **(o)** is important and indicates a strong correlation, which can be explained by the fact that the more the number of milk manifold increases, the quantities collected also increase but the effect remains not very significant, because manifold's number also depends on dairy's cows number and the number of breeders which determine the level of production.

The Pearson's r value = 0.755 and sig = 0.05 for **(l)** indicate a not very strong statistical correlation between manifold's number and integrated quantities. This can be explained by the fact that manifold's number does not directly determine the level of production, and also by the fact that the integrated quantities depend directly and strongly on the milk quality.

3.3. Correlation's analysis of pairs(k)

The couple **(k)** represents relationship between integrated quantities and collected quantities. Pearson's r value indicates a strong positive statistical correlation between the two variables. So the more the collected quantities increase, the integrated quantities also increase. But, as we have already pointed out, integrated quantities depend above all on the quality of milk, so collected quantities are not necessarily integrated if they do not fulfill the quality condition.

3.4. Correlation's analysis of pairs (f), (g), (h), (i), et (j)

The pairs **(f)**, **(g)**, **(h)**, **(i)**, and **(j)** represent the relationship between subsidy amount and the other five variables. For all pairs of variables, the statistical correlations are perfect and positive. This

indicates that the more the values of the five variables increase, the subsidy value also increases sharply. This is true in reality, because subsidy amount depends on the produced milk quantities (determined by dairy's cows number and breeder's number), collected quantities (determined by manifold's number and collected quantities) and integrated quantities. For **(f)**, Pearson's r value is slightly lower than the others, this is due to the fact that some dairies do not receive the integration's subsidy.

V- Conclusion:

Studying vertical links can give us an extent's overview of vertical integration in the dairy industry. Evolution's curves from the six variables seems have the same trend. Which is a proof about the strength of links between these combinations of variables. Pearson's correlation results are satisfying; it confirms strong positive correlation between them.

These results indicate a strong correlation overall. In our research, this correlation is representative about vertical links reality insofar as our seven dairies are engaged in a vertical integration strategy. This allowed us to confirm our assumption of departure.

Our results divide our sample into three categories. Large dairies case, where the vertical links are very strong because these dairies are strongly committed within the vertical integration strategy with medium and long-term prospects as investing in livestock farms at national level, and have a national collection network. The case of SMEs very invested in the vertical integration strategy which results in actions with short and medium term perspectives, like investing in breeding by granting advantages for breeders to win their loyalty. Then SMEs case which find themselves obliged to keep pace with the program imposed by local government so as not to lose the right for producing subsidized packaged milk and obtain subsidized milk powder.

Large companies dispose of bigger financial and material resources than SMEs, then these companies are more willing to invest in the medium and long term in a strategy based on strengthening vertical links to ensure supply. Predominance of large dairies on the local and national market gives us a fairly homogeneous overview about the strength of the vertical links explaining the degree of vertical integration. But, we have to precise that this results speak about how much these firms are engaged in the vertical strategy and not about a strong vertical integration management in the national dairy industry.

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Appendix:

Table 1: Test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Integrated Quantities	,239	7	,200*	,859	7	,147
Collected Quantities	,246	7	,200*	,848	7	,117
Breeder's number	,199	7	,200*	,913	7	,420
Dairy's Cows number	,248	7	,200*	,865	7	,168
Manifold's number	,271	7	,130	,831	7	,082
Subsidy Amount	,231	7	,200*	,893	7	,291

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Survey results processed by SPSS.

Table 2: Correlation

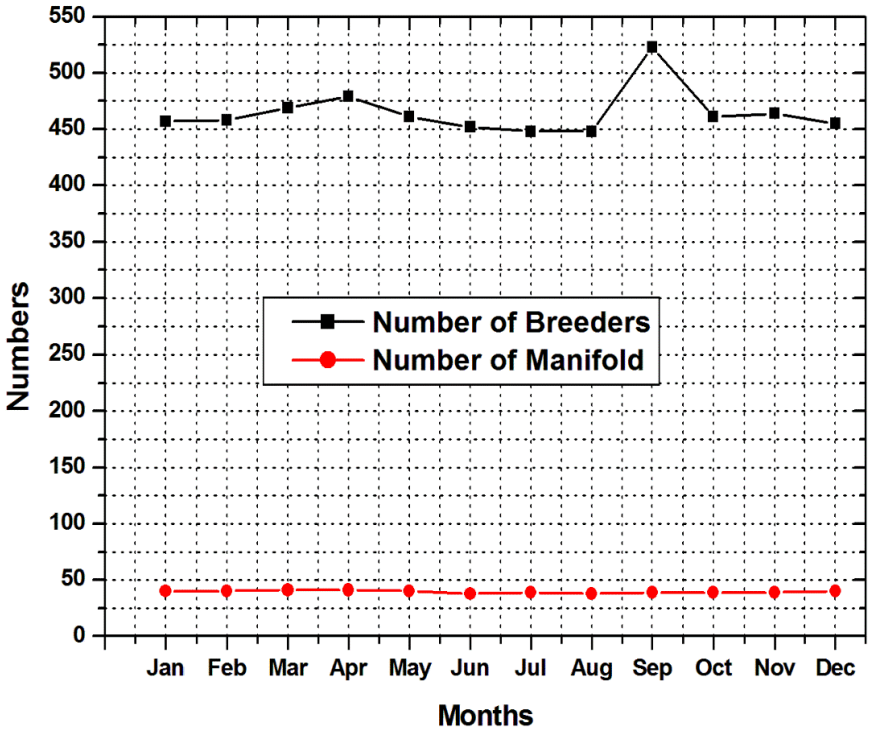
		Integrated Quantities	Collected Quantities	Breeder's number	Dairy's cows number	Manifold's number	Subsidy Amount
Integrated Quantities	Pearson Correlation	1	,842*	,807*	,882**	,755*	,881**
	Sig. (2-tailed)		,018	,028	,009	,050	,009
	N	7	7	7	7	7	7
Collected Quantities	Pearson Correlation	,842*	1	,941**	,993**	,838*	,983**
	Sig. (2-tailed)	,018		,002	,000	,019	,000
	N	7	7	7	7	7	7
Breeder's number	Pearson Correlation	,807*	,941**	1	,954**	,971**	,979**
	Sig. (2-tailed)	,028	,002		,001	,000	,000
	N	7	7	7	7	7	7
Dairy's Cows number	Pearson Correlation	,882**	,993**	,954**	1	,863*	,992**
	Sig. (2-tailed)	,009	,000	,001		,012	,000
	N	7	7	7	7	7	7
Manifold's number	Pearson Correlation	,755*	,838*	,971**	,863*	1	,915**
	Sig. (2-tailed)	,050	,019	,000	,012		,004
	N	7	7	7	7	7	7
Subsidy Amount	Pearson Correlation	,881**	,983**	,979**	,992**	,915**	1
	Sig. (2-tailed)	,009	,000	,000	,000	,004	
	N	7	7	7	7	7	7

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

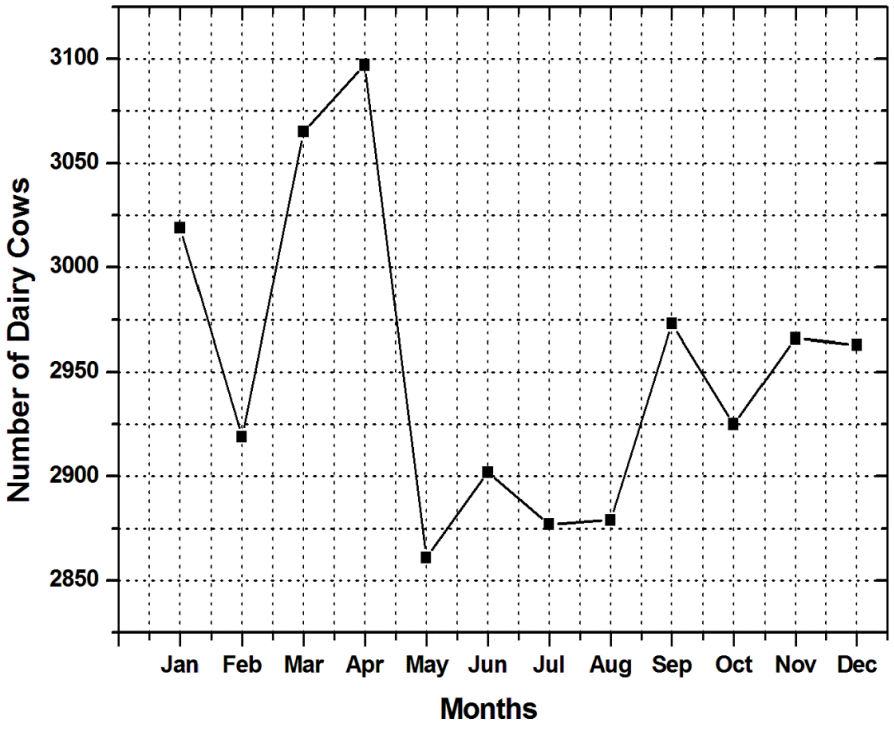
Source: Survey results processed by SPSS.

Figure 1: The breeder's/ manifold's number evolution (2018)



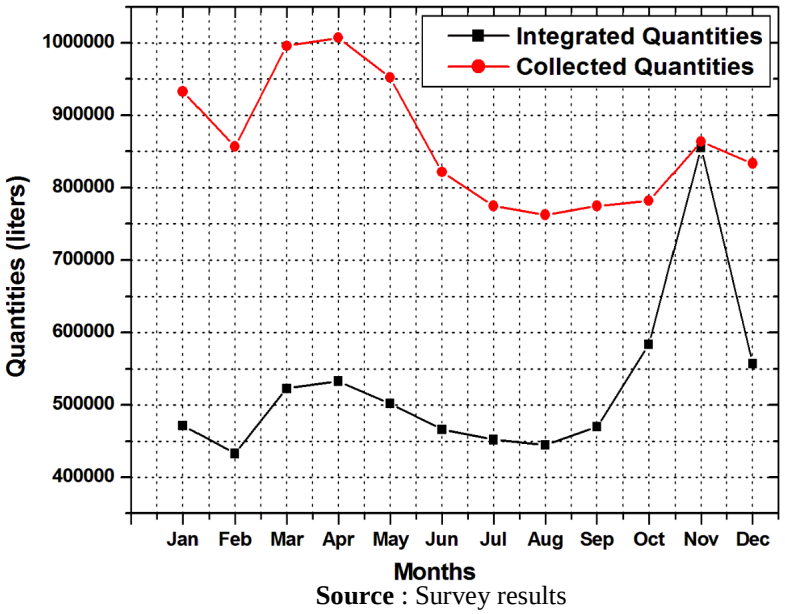
Source : Survey results

Figure 2: The dairy's cows number evolution (2018)



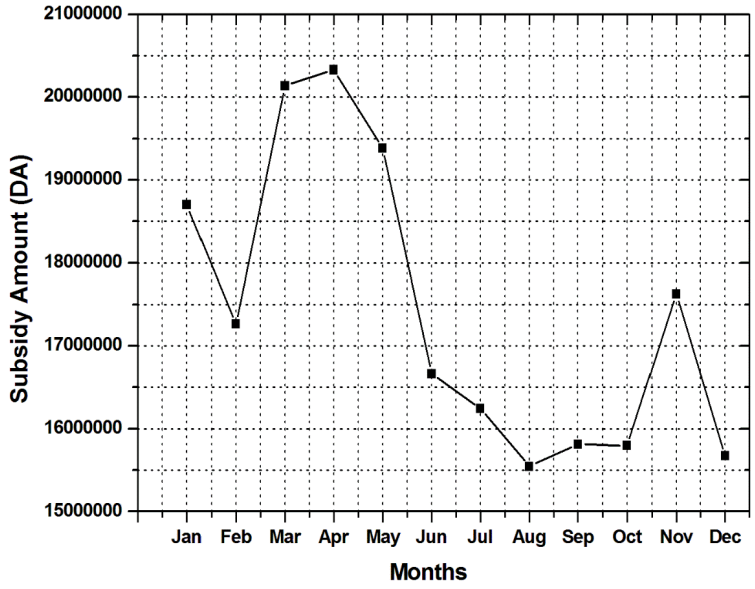
Source: Survey results

Figure 3: The raw milk collected/integrated quantities evolution (2018)



Source : Survey results

Figure 4: The subsidy amount evolution (2018)



Source: Survey results

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