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## Relationship between resources, environmental strategies, and organisations performance: an application in the cold storage sector

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**Abstract:** The article presents a *framework* for the relationship analysis amongst organisational resources, environmental strategy and performance, directed to the cold storage sector. It permits to identify which tangible and intangible resources the company mobilises for the implementation of the environmental strategies and their evolutionary stage, relating them to their performance.

**Keywords:** environmental strategy; performance; framework; sustainability.

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## 1 Introduction

The organisations concern to accept and implement environmental strategies has been accentuated in the last two decades, demanding studies that try to identify if the use of pattern measures, according to what the environmental management system advocates, has really benefited the environment. This way, the studies developed by Ferreira et al. (2011), Rocha et al. (2011), Brock and Sá (2011), Darnall and Sides (2008), Darnall et al. (2005), Martin (2005), Melnyk et al. (2003), amongst others get highlighted. Such studies conclude that the adoption of environmental management systems like ISO 14001, have contributed to the improvement of the waste treatment performance. Also that there are external pressures practiced by the shareholders, government, clients and community, amongst others that influence the environmental management of the company in terms of charging a performance aligned to the corporate social responsibility expectation.

However, the relationship between the resources mobilised by companies to implement environmental strategies has received little attention so far. It is considered that the object of study (cold storage companies) and the context for the research leading (Brazil) permit to generate and advance in the border of knowledge. It is about a sector in which few studies were developed under the optic resources, environment and performance. It is named only Amaral (2003), Araújo et al. (2007) and Alperstedt et al. (2010), but have not investigated the relation among resources, environmental strategy and performance. Their scopes were related respectively to the formulation of a proposal of a business sustainability report model which can be used by the Brazilian and international petroleum industry; business sustainability analysis in a meat cold storage company; and investigation about determining factors of the environmental managing strategies of industrial companies from Santa Catarina belonging to the forest, electric metal mechanic, textile, agro industrial, technologic and mineral complex.

In the international context, it is highlighted the studies over environmental strategies and performance developed by Darnall and Sides (2008), Melnyk et al. (2003), Sharma and Sharma (2011), but while some have identified positive relations among themselves other ones contradict these results. For example, Darnall and Sides (2008) showed that companies that were not participant of voluntary environmental programmes have improved their performance 7.7% above the participants. Still, the non-participants have improved their performance in the self-control 24% more than the participants, while the ones that had ISO 14001 implanted have shown inconclusive performance results and that demand larger studies for the standardisation of conclusions. Yet, Melnyk et al. (2003) evaluated the difference existing in the performance of the companies that have a formal environmental management system (certified) over the ones that are not certified. The results show that the companies that have a formal SGA notice the impacts beyond the pollution reduction and envision a positive impact on the performance of many operational dimensions. Besides, the experience with the ISO 14001 certification along the time has a larger impact on the selection and use of environmental options. In this side, Sharma and Sharma (2011) verified that three factors have influenced in the decision of having a proactive environmental strategy:

- a beliefs and values of the family directed to the environment

- b perception of prevailing the aspects and social patterns over using the company as a means of environmental preservation
- c the extension of the noticed behaviour control, that means, if the environmental actions generate a reputation for the company.

Nevertheless, the relation between the resources mobilised by the company to implement the environmental strategies has not been receiving attention until the moment. This article gives a meaningful step to fulfil this gap, showing and verifying the applicability of an analysis framework that points the relationship among organisational resources, environmental strategy and economic and environmental performance of the companies. It was proposed from two hypotheses resulting from the theoretical synthesis explicit in the sequence and that mirrors that relation.

The discussion gets from the postulate adopted by the resource-based view (RBV) that the success of a company is on a great deal driven from its resources and capacities. In this context, the resources have been classified according to the concept of Grant (1991) and Barney (1991), as tangible (human resources, finances, equipment and facilities) and the intangible (administrative and technological abilities, organisational culture, intrinsic knowledge, relationship between suppliers and clients). The environmental strategies were stratified in reactive, preventive and proactive, according to the classification by Jabbour and Santos (2006), and Maimon (1994). Another analysis dimension had as focus the economic performance on which it was observed the total asset, net equity, operational net earnings, gross profit, profit before the interests and the income tax and the net profit.

In the sequence it is shown a brief revision of literature, followed by the hypothesis that have sustained the framework proposition, the collecting and data analysis technique, a synthesis of the results, and the conclusions of the framework application.

## **2 Framework**

The evidence over the focused relations was found in the studies of Barney (1991), Christmann (1997), and Russo and Fouts (1997), which gives to the resources and capacities of the company power on the competitive advantage obtainment. The first one, precursor of the vision based on resources approach, postulates that the organisation internal resources rule the company's performance and that the competitive advantage comes from the ownership and development of the ones which are superior over the competitors.

Going to the environmental management topics, the other authors consider that this mobilisation of resources interferes on the environmental strategies formulation as well as on its performance. The studies of Sharma and Vredenburg (1998), Berry and Rondinelli (1998), and Aragon-Correa and Sharma (2003) have found that a proactive environmental strategy leads the development of important organisational capacities that can raise the competitiveness on the industries. To enable this kind of action in the company, there is no need of intensive capital use but mainly the use of people with capacity to treat environmental issues. It is necessary to create a responsible and

committed work team, that shares their knowledge, that tunes and that have team working abilities.

However, despite the strategic importance of the intangible assets, as highlighted by Boulton et al. (2001) and Kayo (2002), this does not mean that the tangible ones are losing importance because it is difficult to dissociate a tangible asset from an intangible.

Other studies, like the ones from Hart (1995), Aragon-Correa (1998), Klassen and Whybark (1999), Buysse and Verbeke (2003), Christman and Taylor (2001), Bansal (2005), find that the environmental strategies are expressed through a group of simultaneous investments and under various resources influences. Specifically, Buysse and Verbeke (2003) empirically tested the typology of environmental RBV elaborated by Hart (1995) and checked that the environmental strategies of the company can be expressed on a simultaneous investments way. The same are classified in five influences that consist of:

- a conventional green competences, resulting in investments of products and manufacture processes
- b employees participation and training in environmental issues
- c green organisational competences targeting the functional areas of the company
- d formal management system and environmental management procedures
- e strategic planning that incorporates the environmental issues.

Buysse and Verbeke (2003) found that the simultaneous investments in all the five kinds of resources described by Hart (1995) are consistent with the environmental pro activity.

Besides, organisations that have basic competencies of continuous improvement can be more competent to transfer their expertise and generate moments that encourage great commitments and environmental management (Darnall, 2003).

Thus, the environmental strategic positioning analysis of the company and the way how it has its resources can be evidenced in relation to its economic and environmental development from development indicators.

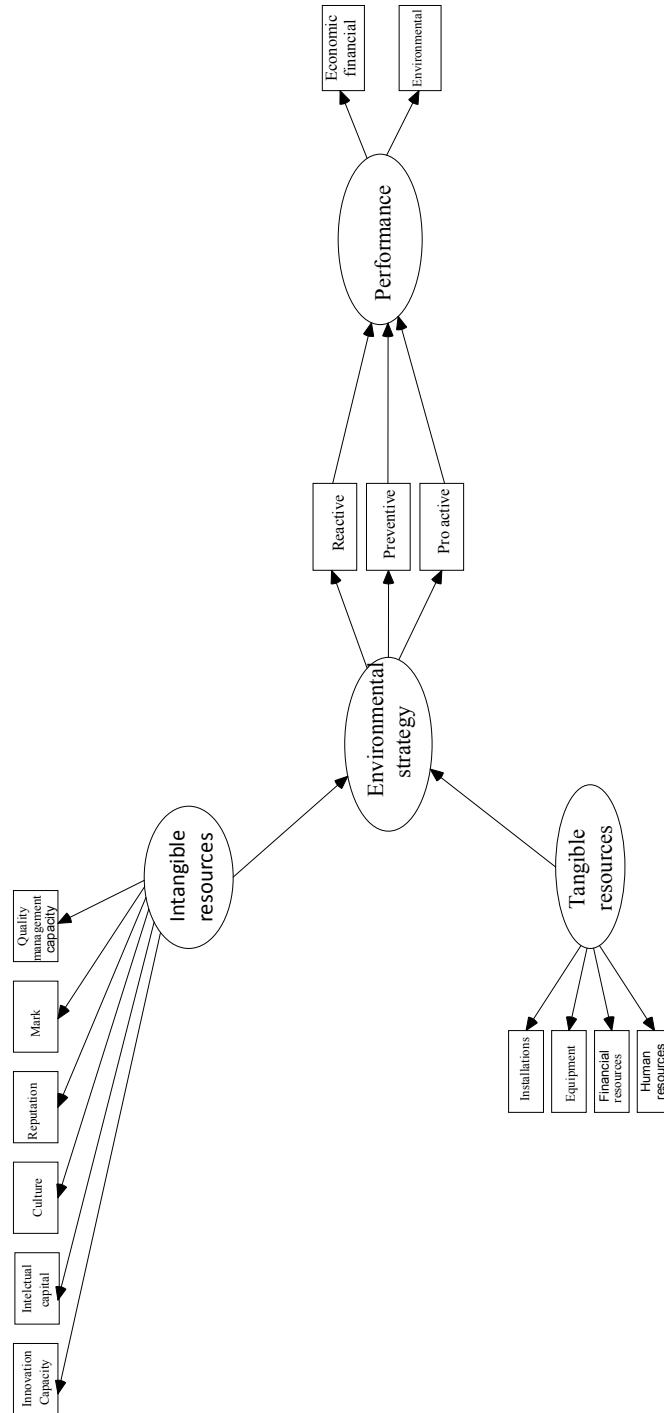
These reflections have led to the hypothesis that guided the study proposal:

Hypothesis 1 The more evolved the environmental strategies, the more tangible resources are mobilised and the better the economic and environmental development.

Hypothesis 2 The more evolved the environmental strategies, the more intangible resources are mobilised and the better the economic and environmental development.

The proposed analysis *framework*, which conceptual map is explicit found on Figure 1, tries to glimpse at the evolved stages of the current environmental strategies in the company and the existing relation amongst them and their economic and environmental development, under the resources viewpoint. The proposal predicts that the used resources interfere in the development level of the environmental strategies and these in the organisation development.

Figure 1 Conceptual framework



Source: Prepared by the authors

On its formulation and result of theoretic synthesis it was formulated an analysis structure composed by the three main dimensions, previously incorporates variables and indicators, as well as parameters and analysis criteria, serving as a preliminary guide for the direction of the search for the data. From this structure, the constituent steps of the proposed framework permit that managers and scholars unveil as the group of postures and resources use by the companies impact on its performance, containing, meanwhile, procedures of the indicators and variables adjust to assist the profile of each organisation. In the analysis model it is predicted the use of qualitative data gotten from the perception of the main managers and quantitative, gotten from the tactic and operational levels and in the company data banks.

The stages predicted for the effectiveness of the proposed analysis, including the approach to the researched company characteristics are:

- 1 Interview with people from the high administration and organisation management for the elaboration of an organisational diagnostic about the resources, environmental strategies and performance from the managers' perception.
- 2 Identification of the current environmental practices, mobilised resources and impact over the organisation current performance; and, questionnaire adjustment for the population quantitative data collection or in the sample defined for each study.
- 3 Questionnaire application for the organisation management team, contemplating the administrative manager, the production manager, the environmental analyst, the human resources manager and the financial manager.
- 4 Data treatment from a quantitative approach, getting averages and statistical relations that together with the qualitative synthesis subsidise the analysis.
- 5 Determination of the correlation amongst resource, environmental strategies and performance.

The interview guide as well as the questionnaire elaboration (with variation for each sector of the company in which it would be applied) followed a structure of blocks that tried to extract specific information of each variable, through indicators that would feed the qualitative and quantitative analysis. They are:

- organisation and interviewee characterisation
- current environmental strategy in the company
- used resources to create the environmental strategy
- economic performance
- environmental performance.

The guide of the interviews and questionnaires can be found in Sehnem (2011).

### **3 Framework applicability**

The applicability verification of the proposed framework was made in the Poultry and Pork Division of an Industrial Group of Cold Storage, formed by 30 industrial units. The intentional choice was by its representativeness, for being internationalised and for

having environmental quality policies, principles and systems of environmental management implanted, as well as certification ISO 14001 in some industrial units. The temporal profile was of seven years, period in which the company data was found available in the Economatica Data Base and that represents a pre and during period in which the group acquisitions have intensified.

The predicted three first steps were followed and in the first there were interviewed the group administrative manager, the environmental analyst, human resources manager and production manager. After, the questionnaires were applied for the organisation management team, contemplating the administrative manager, the human resources manager and the financial manager of the six sample constituent units what has allowed to evaluate the current stage of the organisation in terms of environmental strategy, mobilised resources and performance.

The industrial unit environmental analyst that showed the most advanced stage of the environmental strategies has supplied the qualitative indicators referring to the company environmental performance. These data were treated on a quantitative way and together with the interviews, in which the data treatment was made on a qualitative way, and evidenced the relations focus of the proposed analysis model.

The applied questionnaires were validated in pairs, by a professional of the environmental police and by an agro industry environmental analyst. The instrument shows questions of interval scale. The variance, correlation and regression analysis technique were applied. They are statistic techniques that permit firstly to verify if the observed data behave in accordance with the theoretical expectancy; showing if there are favourable evidences to the data validation and reinforces the proposed analysis *framework*. In the sequence the evaluated variable average calculation were made, taking into consideration the blocks of questions created in the questionnaire, according to Table 1.

**Table 1** Evaluated aspects by each manufacturing unit

<i>Evaluated aspects</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Reactive strategies	5.46	5.0	4.53	4.58	4.08	3.66
Preventive strategies	5.11	3.74	3.68	3.67	3.25	3.68
Pro active strategies	3.46	3.0	2.0	3.20	1.4	2.28
Σ environmental strategies	4.68	3.74	3.17	3.70	2.66	3.06
Intangible resources	4.87	4.66	4.46	4.55	3.80	3.23
Tangible resources	4.98	4.12	4.56	4.87	3.80	3.38
Σ resources	4.92	4.42	4.50	4.69	3.80	3.29
Economic performance	3.60	3.70	4.98	3.39	4.05	4.32
Environmental performance	5.03	4.48	5.23	5.08	5.08	4.03

*Source:* Prepared by the authors

Some evidences could already be identified through the quantitative results as the unit that demonstrated the most advanced evolutionary stage of the environmental strategies was the only one that had ISO 14001 implemented.

All the evaluated units obtained a superior performance in the reactive strategies, followed by the preventive strategies and the worst performance in the pro active strategies. It can be inferred that the studied company is going towards a more pro active

conduct in the environmental management given that there is a concern in adopting practices that go beyond the legislation compliance, corrective and preventive measures, like the renewable energy captation installation; use of tanks; water reuse; alternative energy vehicles use; green energy contracts; suppliers educational programme about responsible environmental practices; suppliers audit, amongst others.

Concerning the mobilised resources to enable the current environmental strategy the same unit has shown superior average and only one unit has mobilised more intangible resources than tangible ones to implement the environmental strategy, what denotes a higher attribution of importance for the quality management capacity, the innovation capacity, intellectual capital, culture, reputation and mark.

However, the unit that has shown a better economic performance was not any of the ones previously mentioned, because the respondents have considered as high impact the aspects: absenteeism level, *turnover*, total training hours, worked hours *versus* made orders, amongst others that are not yet worked together with the company environmental strategies.

The same has happened related to the environmental performance, which unit that has shown better performance does not coincide with the one that was considered the most pro active. Some factors have contributed for this: the involvement of the interested ones in the process of environmental disclosure; the monitoring of energy use in the company; the effective use of water; the emissions in the atmosphere monitoring; the generated waste monitoring; the preservation of the natural resources on the companies environment; the monitoring of the environmental impacts of the products and services; the monitoring of the environmental non-conformities (incidents, accidents and disasters); the environmental innovations; the production process new technologies; the environmental education and the internal environmental auditing. Although the performance of this unit has been considered high, it is more related to the preventive posture and considering that the more pro active strategies in the company can be considered recent this result in a longer term tends to modify, as the current continuous improvement policy in the company has contributed so that the environmental performance could be evaluated with such high excellence in the researched industrial units.

The data evaluation was made from the comparison between the performance amongst the researched organisations, and what would be considered an excellence performance, according to Table 1.

About the mobilised resources, the tangible as well as the intangible ones have obtained a development that was considered 'good' and 'very good', with predominance of 'very good'. That denotes a mobilisation balance of the different resources to enable the current environmental strategy.

Data evaluation was performed based on the comparison between the performance obtained among the organisations surveyed, and what would be considered an excellent performance, as shown in Table 2.

The evolutionary stage of the environmental strategies of the organisation observed was framed as 'very good', and the unit had the full performance in preventative and reactive strategies and units of Unit B, Unit C and Unit D performance 'very good' in the reactive strategies. This indicates a predominance of reactive and preventive strategies in the units surveyed. About the resources mobilised, the performance was 'good' and 'very good', with a predominance of indicator 'very good' for both tangible and resources for



intangible assets. This indicates a balance of different mobilisation of resources to enable effective environmental strategy.

**Table 2** Stage evolutionary aspects evaluated

<i>Evaluated aspects</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Reactive strategies	Full	Very good	Very good	Very good	Good	Good
Preventive strategies	Full	Good	Good	Good	Good	Good
Pro active strategies	Good	Partial	Bad	Good	Bad	Partial
Σ environmental strategies	Very good	Very Good	Good	Good	Partial	Good
Intangible resources	Very good	Very Good	Very Good	Very Good	Good	Good
Tangible resources	Very good	Very Good	Very Good	Very Good	Good	Good
Σ resources	Very good	Very Good	Very Good	Very Good	Good	Good
Economic performance	Good	Very Good	Very Good	Good	Good	Very Good
Environmental performance	Full	Very good	Full	Very good	Very good	Good

Source: Prepared by de authors

With regard to economic performance only drives C and F drive performance reached a ‘very good’ and all the others were framed in the performance ‘good’.

On the issue of environmental performance of the Units A and C reached full performance and B, E and D ‘very good’. It is observed that the current policy of continuous improvement in the company may have contributed to the environmental performance was evaluated with such excellence in the units surveyed.

The authors applied the correlation and regression techniques to verify that the hypotheses could be validated, as shown in Table 3.

The correlation and regression techniques were applied to verify if the hypothesis could be validated, according to Table 3.

**Table 3** Correlation of the proposed analysis *framework* constructs

	<i>Es</i>	<i>Resources</i>	<i>Econ. develop</i>	<i>Envir. develop</i>	<i>Tang resor</i>	<i>Int. resor</i>
Ea	1					
Resources	0.712306	1				
Developm	0.420437	0.546412	1			
Envir Dev	0.655436	0.849078	0.779702	1		
RecTang	0.726229	0.986457	0.562602	0.863295	1	
RecInt.	0.68939	0.9923	0.524326	0.823605	0.958556	1

Source: Prepared by the authors

It is highlighted that the level of correlation existing between resources and environmental strategy is high. However, the correlation between performance and environmental strategy is moderate, and between performance and resources this correlation was equally moderate, keeping the same behaviour in the correlation between environmental performance and environmental strategy. Yet, the correlation between environmental performance and resources and environmental performance and economic performance were considered high. The variation of the coefficient that got closer to 1 was the correlations established between intangible resources and resources, tangible resources and resources, and intangible resources and tangible resources. This result is as expected given that the variable resources are formed by adding the tangible resources and the intangible ones. This permits to validate Hypothesis 1, because the correlation that is established between tangible resources and environmental strategy is high (coefficient 0.726229) and between intangible resources and environmental strategy is moderate showing a coefficient variation of 0.68939. Nevertheless, the correlation level existing between economic performance and environmental strategy is moderate, showing a coefficient of 0.420437. This behaviour is similar to the correlation existing between environmental performance and strategy which correlation coefficient was 0.655436. Considering that Hypothesis 1 is possible to make an inference that the proposed analysis *framework*, applied to the group in present has elucidated that the environmental strategies have high correlation with the tangible resources, but shows moderate correlation with the economic and environmental performance.

Hypothesis 2 was validated, since the correlation between intangible resources and environmental strategy was moderate, showing a coefficient 0.68939, keeping similar behaviour in the correlation existing between intangible resources and economic performance, which coefficient was 0.524326. Specially, the existing correlation between intangible resources and environmental performance was high, with a coefficient 0.823605. There are indications in these results that the intangible resources impact on a more intense way over the environmental performance, because it was in the crossing of these two variables, as proposed by the *framework*, that there was higher adherence.

This is corroborated by Aragón Correa and Sharma (2003) that the positive relationship between environmental strategies and organisational performance comes from the development of complex, valuable and rare capacities and resources. In the case of the cold storage sector, the greater emphasis is found in the development of intangible resources. Also, Sharma and Vendrenburg (1998) highlight that the resources development provides a group of competitive benefits, such as, processes and raw material cost reduction, processes, products and systems innovation, and at last reputation improvement. Thus, in the context of the analysed triad (resources, environmental strategy and performance) the vision based on resources permits to understand in which way the resources and capacities can improve the firm reputation, the exploration of marketing opportunities through the offer of innovative products and the management of its operational efficiency, which was also investigated by Santos and Porto (2011).

Right after, Table 4 shows the regression between the variables resources and performance.

Table 4 shows and R-square adjusted of 0.27351518, showing that the variation of the dependant variable is linked to the independent variable 27.35%. Next, Table 5 shows the summary of the environmental strategy regression and performance results.

**Table 4** Resources and performance regression

<i>Regression statistics</i>	
R multiple	0.546412281
R-square	0.298566381
R-square adjusted	0.27351518
Standard error	1.167285103
Observations	30

*Source:* Prepared by the authors

**Table 5** Summary of the environmental strategy regression and performance

<i>Regression statistics</i>	
R multiple	0.4204369
R-square	0.1767672
R-square adjusted	0.147366
Standard error	1.1362789
Observations	30

*Source:* Prepared by the authors

The R-square adjusted was 0.147366 showing a soft, almost imperceptible linear relation between the independent variable and the dependent one.

**Table 6** Summary of the environmental strategy regression and resources

<i>Regression statistics</i>	
R multiple	0.712306099
R-square	0.507379978
R-adjusted square	0.489786406
Standard error	0.878981329
Observations	30

*Source:* Prepared by the authors

It is observed in Table 6 the value of R-square adjusted, which is 0.489786406 showing a moderate linear relation between the variable environmental strategy and resources.

In summary, it was possible to find the possibility of the framework application in the group. Reapplying it in all Brazilian cold storages of medium and large scale will permit a organisational diagnostic of the cold storage segment and for sure will produce important information for the managers' decision making of these agro industrial establishments. Improving the sample, it will also be possible to obtain higher consistence of analysis and results subject to generalisation for the sector.

Next, it is shown the evaluation of the economic performance with secondary data through total asset indicators, net equity, operational net earnings, gross profit, profit before interest and income tax and net profit (Table 3 – data obtained in economatica data base).

The total asset of the company, which corresponds to its goods and rights expressed in currency has obtained an exponential rise between 2004 and 2010, in and order of

6,560.75%. Considering that the acquisitions intensified between 2008 and 2010, it is expressed in this indicator the increase of the organisation assets in 146.85%. Similar behaviour is observed for the net equity, the operational net earnings, the gross profit and the LAJIR. However, the net profit in the year 2008 showed a loss that can be associated to the intensification of the group acquisitions.

**Table 7** Change in total assets, net worth, net operating revenues, gross profit and earnings before interest and income tax

<i>Years</i>	<i>Total assets</i>	<i>Net worth</i>	<i>Operating revenues</i>	<i>Gross profit</i>	<i>Net income</i>	<i>Earnings before interest and income taxes (EBIT)</i>
2004	339,295.00	61,710.00	1,306,540.00	176,083.00	24,977.00	62,501.00
2005	672,079.00	175,618.00	1,359,811.00	228,998.00	33,652.00	108,117.00
2006	1,717,804.00	220,988.00	2,130,509.00	420,324.00	64,304.00	214,969.00
2007	4,330,666.00	1,282,327.00	3,339,949.00	666,873.00	84,955.00	331,181.00
2008	9,155,172.00	2,729,851.00	6,203,797.00	1,326,972.00	-35,500.00	724,586.00
2009	11,451,641.00	4,184,285.00	9,615,740.00	1,381,394.00	679,079.00	545,080.00
2010	22,599,586.00	6,353,288.00	15,878,469.00	2,601,445.00	140,092.00	881,744.00
Total	50,266,243.00	15,008,067.00	39,834,815.00	6,802,089.00	991,559.00	2,868,178.00
Average	7,180,891.857	2,144,009.571	5,690,687.857	971,727.00	141,651.29	409,739.71

*Source:* Economática (2011)

The total assets of the company, including its assets and rights of the company expressed in foreign currency obtained an exponential rise in the period 2004 to 2010, an order of 6560.75%. Whereas the acquisitions intensified in the period 2008 to 2010, this indicator is expressed in the rise of the assets of the organisation during this period as a percentage of 146.85%. Similar behaviour is observed for the net worth, net operating revenues, gross profit and EBIT. However, the net profit in 2008 showed a deficit of R\$ 35,500.00 which may be associated with the intensification of the acquisitions made by the group. At the same time, it shows that the extent to which the company was growing and making more acquisitions, financial indicators also showed positive rise, which shows that this strategy has had positive economic results for the group.

The environmental performance evaluation was conducted through secondary data by means of indicators: energy consumption, water consumption, solid waste, wastewater treatment and air emissions (get data in sustainability reports). These reports take, usually, the GRI guidelines to establish the indicators evaluated. It is recommended to consider the following indicators described in Table 8.

At the same time, it shows that as the company was growing and having more acquisitions, the financial indicators also obtained positive increase, which shows that this strategy has preformed positive economic results for the group.

Having made the application, it was then made the fitting based on Table 9, and the company has stayed on quadrant four which shows full meeting of the observed requirements.

**Table 8** Indicators of environmental performance evaluated

Evaluated aspects	2010 compared to 2009					
	Quantity*	1	2	3	4	5
		Did not reduce	Small reduction	Strong reduction	Very strong reduction	Does not know
Water use					X	
Energy use**			X			
Percentage of used materials coming from recycling			X			
Use of toxic inputs					X	
Solid waste			X			
Soil contamination					X	
Waste water emission					X	
Green house effect gases emission			X			
Emission of deteriorising substances of the ozone layer					X	
Noise					X	
Smell/odour emissions					X	
Environment damage					X	
Risk of serious accidents			X			

Notes: \*It was established symbolic values to use the analysis framework because the company did not give these values. Concerning the environmental performance, the questioning was made from qualitative indicators for the environmental analyst of Unit A, which has shown the highest stage in the environmental strategies to establish estimate values to validate the framework of analysis.  
 \*\* MWh per tonelate produced.

Source: Prepared by the authors

**Table 9** Evaluation of the organisation for a scale of 5 points\*\*

Evaluated aspects	Score	Requirement level
Description	1	Bad
	2	Partial
	3	Good
	4	Complete
	5*	Empty

Note: \*When the respondent would check the neutral indicator it was given zero in the moment of data tabulation for the referred.

Source: Prepared by the authors

It was checked that there is full impact over the environmental practices in the organisation performance, even if the values of some topics have been indicated by the environmental analyst based on his/her perception and living on the organisations routines, in view of not being monitored by the company.

The productive performance evaluation was made from the turnover indicators, absenteeism, training hours per employee on year average, automation level in the production line, also taken from the perception of questioned subjects. Its fitting, based on the stages of framework operationalisation, was made according to Table 10.

**Table 10** Current stage of the productive performance

<i>Evaluated aspects</i>	<i>Score</i>	<i>Requirement level</i>
Description	1	Awful
	2	<i>Bad</i>
	3	Partial
	4	Good
	5	Very good
	6	Complete
	7*	Empty

*Source:* Prepared by the authors

**Table 11** Framework applied to the pork and poultry division of the group

<i>Number classification</i>	<i>Performance level in the evaluation</i>	<i>Legal requirements fulfilment</i>	<i>Perception of the mobilised resources</i>	<i>Environmental strategies</i>	<i>Impact over the organisational performance</i>
From 0.1 to 2	Awful	Vague indications of assistance	Weak mobilisation of resources	Does not fulfil	High negative impact
From 2.1 to 3	Bad	Precarious assistance	Precarious mobilisation of resources	Reactive strategy	Medium negative impact
From 3.1 to 4	Partial	Partial and reactive assistance	Partial mobilisation of resources	<i>Full reactive strategy</i>	Soft negative impact
<i>From 4.1 to 5</i>	<i>Good</i>	<i>Assistance based on control/correction</i>	<i>Good mobilisation of resources</i>	Full preventive strategy	<i>Soft positive impact</i>
From 5.1 to 5.9	Very good	Pro active assistance	High mobilisation of resources	Pro active strategy	High positive impact
6 or excellence	Complete	Full assistance	Full mobilisation of resources	Full pro active strategy	Full positive impact
0*	Empty	Non-assistance	Non-mobilisation	Does not fulfil	Does not impact

*Source:* Prepared by the authors

On this item, there was also no authorisation of the group to use the organisation real data. Facing this, it was made a simulation from the perceptive answers received from the questionnaires application. It was possible to check that the pork and poultry division of the group is in a level of bad productive requirement meeting level, due to the high level of absenteeism and *turnover*.

The correlation amongst resource, environmental strategies and performance forms the last stage of the proposed analysis framework and is found and explicated on Table 11.

From the obtained results through the questionnaires application it was possible to fit the pork and poultry division of the group in the level of good performance, with the fulfilment of the legal requirements based on control and correction. Good mobilisation of the resources to enable the environmental strategies, which were fitted as predominantly full reactive with high evidences of existing full preventive strategies and that cause an impact on the organisational performance considered positive.

#### **4 Discussion on the application of the framework**

The implementation of the framework allowed to frame the swine and poultry division of the group-level perform well, with attendance of the legal requirements based on the control and correction. It makes a good mobilisation of resources for achieving environmental strategies, which in turn were classified as being predominantly reactive full with strong evidence of full and preventive strategies that cause an impact on organisational performance as positive.

In the enablement of the current strategies the human resources; physical resources (installations, machinery and equipment); administrative abilities; organisational culture; renewable natural resources; intellectual capital; innovation capacity and mark are mobilised on a more accentuated way. The valuable, rare, inimitable and organisational resources mobilised consist of intangible resources that have and interface with the organisational culture. Amongst the tangible it was given emphasis to the equipment and human resources.

From the study, we validate the framework analysis of resources, environmental strategies and performance of organisations in porks and poultry division of the group. It is recommended to validate the same in other sectors, to see if it serves to generate generalisations when applied to different sizes of companies.

The company tries to incorporate aspects inherent to the production and product, in a way of explicating to the consumers its posture aimed at the sustainability. So, the environmental attributes incorporated to the productive process minimise the production impact and the use of product from the environment, an example of the renewable energies and the recycle of water. Besides, they offer to the consumers utilitarian benefits, an example the situation in which the use of packaging is reduced. Still, symbolic benefits, which are consistent with the values system and social recognition

The company develops programmes and projects in the industrial units that promote the reduction of emission of the greenhouse effect gases (GEG), among which there are contemplated actions of: installations of bio digesters for the liquid effluents treatment and electricity generation; installations of a primary system of liquid effluents treatment; recuperation and use of gases of process; use of renewable bio fuels; geo spatial

monitoring of cattle suppliers in the Amazonia region; reverse logistic programmes; committees and forums participation; replacement of refrigeration gases; recuperation and co-generation of energy in the processes; monitoring of CH<sub>4</sub> emissions in the cattle diet.

It was found that the environmental practices are distinct by industrial unit, having a variation of use of resources, environmental strategies and the obtained performances from the acquisition process made over the last three years. However, all the units follow the environmental management principles recommended by the company environmental management system and there are two industrial units and the private port that have ISO 14001 implanted. It has received a meaningful number of auditing, which corresponds to 253 audits in 2010, which shows the commitment with efficiency, the controls, the continuous improvement and the excellence in the management process. It was evidenced that the pork and poultry division of the group acts on a pioneer and innovative way in terms of environmental strategy.

Regarding the age of the company in the researched industrial units and its impact in performance, it was checked through the variance analysis that it does not influence in a meaningful way on the aspects evaluated in the present study. For example, the industrial unit of Uberaba was built in 1995 and does not show the best performances. Yet, the Itapiranga unit was built in 1960 and shows higher performances in the evaluated topics. On the other hand, it is important to stress that the Uberaba industrial unit has only implanted the principles of environmental management, since 2010 and Itapiranga has besides these ones, the environmental management system, ISO 9000 and ISO 14001 implanted. This makes evident that the environmental certification tends to contribute for the improvement of the environmental strategies implanted in the company and impacts the performance.

Another finding is related to the employees' average level of education in the researched industrial units. The industrial unit of Itapiranga, which shows the best performance, is the one that has the higher number of employees with complete high school level and college education and specialisation, which allows to infer that this factor can also have contributed for that in the analysis of variance this industrial unit could show higher averages in the evaluated items environmental strategies and mobilised resources, but that has not necessarily impacted on the performance economic financial and environmental in the industrial unit.

Some units follow the requirements of the World Bank and the specifications required by the clients. And the worries are always directed to efficiency; for example, one of the units has shown an efficiency of 99.6% in the system of waste treatment in 2010, according to what has mentioned the environmental analyst. Some units have green contracts of energy buying, as an example of the same unit that buys this energy from Maranhão. For each environmental inconformity there is the concern of creating an Action Plan to minimise the environmental impacts.

Nevertheless, the implemented environmental strategies can be associated to formal and informal pressures coming from organisations with whom the group keeps dependency relations, that is, the essential ones for their survival. They are examples of coercive processes that the organisation receives the determinations and legislation from the State, the funder banks, the relation between headquarters and branches and the relation between buyers which status is oligopsony and suppliers considered oligopolies.

As it is a Brazilian multinational with meaningful importance in the context of the productive chain and of the society, it needs to raise funds from the National Bank for



Economic and Social Development – BNDES and other organisms that demand that improvements in continuous improvement in the environmental area are made. For being the coordinator of the productive chain and for representing an agro industrial oligopoly, it outlines actions for the other links, but also produces restrictions for them. The producers get to be dependent of few companies and this gives them some competitive disadvantages, like the practically absence of price competition in the acquisition of raw material produced by them (chickens, and pigs). However, looking at the agro industry, for the company to keep competitive in the international scenery, this is a worldwide tendency, given that the productive concentration derives power for the organisations to negotiate and pressure over governmental entities and controlling organs to promote a higher efficiency in the productive system. Likewise, in the agro business reality, the margin per commercialised unit is small and makes the organisations competitive from the moment they have a production scale.

## **5 Conclusions**

Regarding the environmental strategies it is possible to highlight that the formulation process comes from the company's strategic team (inclusive incorporated in the mission, vision and values) and is decentralised for the committees that establish action plans for the unconformities of the productive process and act seeking alternatives for better producing. Regarding the implementation, it involves all hierarchic levels of the company, and the controls are made through performance indicators and internal and external audits. So, the environmental strategy contributes for the attainment of competitive advantage of the company, but nowadays only through the buying preference, as the clients are not willing to pay more for the fact of buying products originated from a productive process ecologically correct. The 'green wave' is making many managers conscious and getting adepts from the most distinct sectors, which seem convenient facing the nature setbacks, which rebels facing the intense environmental impacts and degradation yet made by the human beings. Still, it permits the participation in sustainable action portfolios, for the ones which have stocks in the stock exchange, as an example the group belonging to I50 (Bovespa Business Sustainability Index).

It was possible to testify hypothesis H1 and H2 for the researched sample. This shows that the environmental strategies have a high correlation with the tangible resources, but show moderate correlation with the environmental and economic performance. There are traces in these results that the intangible resources impact on a more intense way on the environmental performance. There is a predominance of reactive and preventive strategies, and the environmental strategies average vary between 2.66 and 4.68 in the researched industrial units (check Table 11). Yet, for the resources mobilisation this variation was from 3.29 to 4.92, which denotes a very good evolutionary stage of resources use to enable the environmental strategies. The economic performance varied from 3.39 to 4.98, which shows a good impact of the environmental strategies on the economic performance. And the environmental performance was from 4.03 to 5.23, with predominance of a very good evolutionary stage and the full one in two industrial units.

The contributions of this paper consist basically in two relevant aspects in empiric studies of this nature, that is, practical and theoretical. The first one is associated to demonstrating how important for the company is the mapping of its tangible and

intangible resources used to establish its environmental strategy, and which notably reveals the necessity of a continuous evaluation, as well as the acuity of its endogenous and exogenous actions. And the second aspect refers to the applicability of theories used recurrently in the international academy, and that can be tested and evaluated in the national context. This way, new findings and results are aggregated to the scientific environment. Especially, it makes evident that it is not the period of time that is taken to replicate the firm resources which define the competitive advantage existence, but the inability of the current and potential competitors of duplicating such resources that promote the sustainable competitive advantage for the multinational group. These premises are aligned with the sayings of Barney (1991). The same way that the resources of a company of the cold storage able to generating competitive advantage are entitled to have a replication by the competitors, however, need a longer time to be copied. This shows that the competitive advantage of the company is sustained for a certain time, which is positive.

Soon, as a recommendation for future studies it is suggested the advance of the research on a comparative way among other companies of the same sector, with the use of quantitative resources and statistics techniques more robust as an example of the structural equations and panel data. Likewise, develop a study that verses over the strengths and weaknesses of the company's internal resources; and the opportunities and threats that the company can derive in the environment that it competes. Besides, to identify if these resources that are considered strategic are similar to the ones that industrial units located in other countries have. Another possibility of investigation consists of identifying if the processes of the company's internationalisation lead the generating resources of competitive advantage altered, which could be entitled of measuring through a longitudinal study. Also, to investigate the set of images and perceptions that the internal and external public has regarding company X. Considering that the environmental strategies can derive competitive advantage for the organisations, studies that traverse about management and analysis of green supplies chain can be important for identifying the 'bottleneck' and contribute for the decision taking and organisational performance. Investigations that traverse about operation strategies, which incorporate the capacity and the intangible resources for the implantation of responsible environmental practices inside the organisation, enabling sustainable operation strategies. Evaluate the impact over the performance of the environmental technologies choices operation. Identify which evolutionary stage (reactive, preventive or proactive have a higher impact on the economic/financial and environmental performance) and if different environmental technologies provides distinct impacts.

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