Abstract

The purpose of this study is to verify if there is any established system to evaluate the performance of meat and industrialized poultry products supply chain in Brazil and its main
characteristics. The research design adopted was exploratory, by means of using the case study method. The supply chain, object of analysis, was mapped and delimited using a company that represents the industrial macro-segment, denoted as a focal company. Semi-structured interviews were conducted with directors, managers and technicians of the focal company. A total of 38 semi-structured interviews were tape-recorded, adding up to a total of 30 hours of recordings.

**Key-words**: performance measurement; agrifood; supply chain

1. **Introduction**

In the last couple of decades it became possible to observe changes in the worldwide macro-segment with the opening and globalization of markets. The meat market of Brazil and around the world is becoming more complex and competitive. A competitive and complex market as the meat and poultry market requires a continuous association of technical knowledge with management in order to understand the increasing concerns of the consumers with health, risk of contamination, misusage of antibiotics and proper disposal of residues.

Brazil has already become one of the larger food producers worldwide, especially when it comes to grains and animal protein. The production of poultry in Brazil grew largely during the last twelve years, varying from a total of 2,055,287 tons in 1989, to 6,735,696 tons in 2001. Out of this total, 5,486,408 tons were consumed internally and 1,249,288 were exported. (ABEF, 2003).

The growth of poultry exports in Brazil is a result of the increasing competitiveness of national producers which are exporting to over one-hundred countries. In 2002, Brazilian exports were responsible for 31% of the international poultry commerce. This is a result of a great rigorous sanitation control of our national products and the investments to promote and spread competition of the Brazilian product in international markets (Avicultura Industrial, 21/01/2003).
However, it is not easy to export, because there is a critical need for the support of the Brazilian government in the establishment of sanitation agreements with the markets in prospect, since the exporting markets maintain a rigorous control of their meat imports.

In order to maintain the conquered position and also in order to gain new markets, Brazilian companies from the meat and industrialized poultry agribusiness segment need to invest and improve their management. One of the management areas that need improvement in the Brazilian agribusiness is the ability to manage and evaluate the performance of the supply chain, uniting suppliers and clients and not only the productive chain.

Trying to understand management and the evaluation of execution is already a hard task in individual organization, but the comprehension and the application of these concepts in chains, or among a series of individual companies, represents a challenge for the academic area as well to the managerial area. It is necessary to review concepts and to establish new forms of negotiation and relationships among organizations. This study searches to contribute to the construction of a theory to evaluate performance, based on a case study of a meat and industrialized poultry products supply chain in Brazil.

This article is divided into eight parts. Besides this Introduction, there are the items for the Definition of the Research Problem, Literature Review, Methods and Procedures of Empirical Research, Presentation of the Results of the Empirical Research, Conclusions and Suggestions, Bibliography, and, Attachments.

2. Definition of the Research Problem

Considering the matters and tendencies so far exposed about the importance and the present state of affairs of the studies about management and performance evaluation of agribusiness chains,
and, considering that the evaluation of the performance of the supply chains is part of the supply chain management, the Research Problem proposed for the analysis of this study is out-folded into the following specific component: How is the performance of meat and industrialized poultry products supply chain evaluated in Brazil?

The questions formulated to answer this specific component are the following:

Q1 – Is there an established system to evaluate the performance of meat and industrialized poultry products supply chain in Brazil?

Q2 – What are the characteristics of the systems which are used to evaluate the performance of meat and industrialized poultry products supply chains in Brazil?

Q3 – What criterion or performance indicators are used to evaluate meat and industrialized poultry products supply chains in Brazil?

3. Literature Review

3.1 Performance Evaluation

Evaluation of performance is a vast and complex theme which appears with frequency in the studies and publications of diverse areas of business management, and, it is of great interest to the academics and managers. Many studies use Entrepreneurial Performance to analyze matters of strategy and process. (VENKATRAMAN and RAMANUJAN, 1986).

Brown and Laverick (1994) define the evaluation of performance in its most simple form; as a way in which an organization verifies the effectiveness of their decisions in order to identify if the development is successful or not.
McIntyre et al. (1998) define the measurement of performance as a tool of management which enables the further understanding of operations and processes. According to these authors, the metrics are valued by the financial institutions and are a way in which to compare organizations. The Council of Logistic Management (1995, p. 27) establishes that the measurement is related to the level of performance of a company, and that an effective measurement should calibrate the results of a company in terms of a functional evaluation, process evaluation and benchmarking. Although the focus of this study is to evaluate the performance of supply chains and not of individual companies, we understand that the comprehension of the concept and evolution of studies and approaches about organizational performance and the measurements used to evaluate the performance of individual companies could contribute for the development of the study of performance in chains. This thought is based on the fact that supply chains are essentially formed by many companies that act mutually with a series of interconnected processes.

3.2 Organizational Development: the evolution of approaches

When faced by difficulties, one should foresee the external and internal circumstances which impact the success of an organization, and consequently, in their efforts, Brown and Laverick (1994) consider that the present methods are inadequate to measure the organizational performance in an effective and realistic manner. Venkatraman and Ramanujan (1986) say it is necessary to adopt an objective or an area of study in order to enable further advancement, especially in matters about performance measurement. According to the authors, a multi-subject perspective would possibly limit itself to show the differences among terminologies and assumptions existing in diverse subjects. The authors present a delimitation of the studies of Organizational Performance, under the perspective of
strategic management. They support that the Organizational Performance is a sub-part of a wider concept of Organizational Efficiency. They also divide the concept in Organizational Performance according to the performance indicators utilized:

- **Financial Performance** – limited and used more in research about organizational performance and is based in the usage of financial performance;
- **Operational + Financial Performance** – wider concept about organizational performance which uses financial and operational (not financial) performance indicators.

Venkatraman e Ramanujan (1986) believe that a performance evaluation or research which is based in any of the approaches that only consider one of the indicating groups, be it financial or operational, is limited and should be avoided.

Continuing in this line of thought, Chakravarthy (1986) presents organizational performance and organizational efficiency as two different matters under which the studies of strategic performance have been developing. Besides the indicator used (financial or operational), another aspect is brought-up by Venkatraman and Ramanujan (1986) that the mediation of Organizational Performance is the source of the utilized data. The data could be the primary source, collected directly from the organization, or, the secondary source, collected from bulletins or reports published by companies.

During many years, executives and managers of many different industries have been worried about rethinking the way in which to evaluate the performance of their companies. Nowadays, faced by the new strategic and competitive reality which requires new systems of measuring performance, this concern has become more evident and has caused a revolution in the way in which companies measure their performance (ECCLES, 1991).
The fundamental difference resides in considering the financial indicators (so far seen as the base of performance evaluation) as one in many measurements of performance to be considered. This change does not consist simply in changing the financial statistic base of the systems of evaluation of performance for another one, but to establish a new philosophy of evaluation. The metrics related to the quality turned this revolution into reality and, as the competition tightens, strategies which focus on quality naturally evolve into strategies based in customer service (ECCLES, 1991).

Kaplan and Norton (1992) confirm and agree that with there is need for a new approach in evaluating performance. The authors affirm that the traditional measurements, such as the return of investments and profits per action, work well in the industry, but do not correspond to the abilities and responsibilities which the companies strive for nowadays. An appropriate approach to evaluate the performance of an organization does is not the choice between financial or operational measurements. No measurement (isolated) is capable to promote an objective of a clear performance or focus in the aspects or critical areas of a business.

Brown and Laverick (1994) also support that the realistic model to evaluate the performance is complex and requires more than just one criterion to be considered in order to define it. The authors say that it is necessary to establish a compound measurement of performance, of which multiple aspects should be considered. Financial criterion represents only one element of the organizational performance and only measure the benefits attained by the shareholders. According to the authors, the success of any organization is measured by its ability to satisfy all of its stakeholders.

De Toni and Tonchia (2001), show a summary of the main changes and tendencies in the system of evaluating performance presented in the academic literature. According to them, the new
approach, which characterizes this innovative system of evaluation, includes other changes which go beyond the usage of measurements of non-financial performance. In fact, the modern systems of evaluating performance are evolving from an approach based in control and costs aimed towards the measurement of the creation of value in non-financial indicators, besides the traditional financial indicators.

3.3 Models of Performance Evaluation Focused on Individual Organization

De Toni and Tonchia (2001) affirm that although the evaluation of management operations performance is increasingly important, there are only a few empirical studies which present models, characteristics and indicators of Systems of Evaluating Performance. According to the authors, literature about Systems of Evaluating Performance (SEP) is vast, full of concepts, and articulated ideas, but with little conceptual framework. The authors classify the main models of SEP present in literature into five categories, defined in Box 1.

In a global competitive environment, companies search to improve their performance by choosing adequate business strategy, manufacturing strategy, and technologies. According to Gunasekaran (2001), the definition of competitive positioning of a company in relation to its competitors should be done based on the performance evaluations in the strategic, tactic and operational levels. The companies need to align their business strategies with their operational strategies. They also have to monitor the results of these strategies based in systems of evaluating performance and criterion of adequate performance.

A model of performance evaluation aimed towards strategic business choices and its usage in academics and entrepreneurial practice, has already become a classic presented by Norton and Kaplan (1992). According to the authors, the complexity of managing an organization,
nowadays, requires for the managers/entrepreneurs to be capable of visualizing and analyzing the performance of different areas simultaneously. Therefore, the managers need a strategy which can level out the financial and operational measurements. Following this line of thought, Norton and Kaplan (1992) propose a group of measurements which allow for the higher management to obtain a quicker, more comprehensive vision of their business: the balanced scorecard. This model includes financial measurements which inform the results of the invested stock, and, operational measurements linked to the customer satisfaction, internal processes and innovation. This operational measurement is considered be what will direct the future of financial performance.

Box 1 – Types of Models of Systems of Evaluating Performance

<table>
<thead>
<tr>
<th>Types of Models</th>
<th>Main Characteristics</th>
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<tr>
<td>Models that are strictly hierarchical (or vertical)</td>
<td>Indicate operational cost presented in different levels of aggregation, but in the end presented according to the financial-economic results.</td>
</tr>
<tr>
<td>Balanced Scorecard Models</td>
<td>Many independent considerations, with different perspectives (financial, internal processes, clients, education) of analysis. The connections among them are general.</td>
</tr>
<tr>
<td>Aggregating Models</td>
<td>Present a synthesis of measurements of operational level, transformed in aggregated indicators. The financial-economic measurements are separated from the aggregated client-satisfaction measurements.</td>
</tr>
<tr>
<td>Models that differentiate between internal and external performance</td>
<td>These are the only ones noticed daily by the consumers.</td>
</tr>
<tr>
<td>Models relates to the value chain</td>
<td>Consider the relationship between clients and suppliers.</td>
</tr>
</tbody>
</table>

Source: based on DE TONI and TONCHIA, 2001

Unlike the traditional systems of evaluating performance which originated with the financial functions, the balanced scorecard puts strategy and vision (not control) in the center of the system of evaluating performance. The authors believe that this new approach to evaluating performance corresponds to the new organizational challenges; integration among functions,
global scale, partnership with suppliers, and, continuous improvement and commitment of the group (KAPLAN e NORTON, 1992).

On the subject of the connection of performance with the choices related to manufacturing strategies (GUNASEKARAN, 2001), Hayes and Upton (1998) argue that in the same way that a product is the result of a combination of many project parameters, an operation should reflect its own group of parameters. A strategic positioning should begin with deciding how the company wants to differentiate itself from the competition. Once these objectives are prioritized, the company should configure and manage its operations in a way in which they will establish their advantage. The truth of the matter resides in assuring that the process of decision making will not be isolated from competitive and strategic facts (SKINNER, 1969).

A classic model for formulating the content of an operational strategy is proposed by Slack (1993). He highlights the importance of the objectives of performance in the elaboration of the operational strategy. According to him, the function of production embraces all relevant and determining aspects of competitiveness: quality, speed, reliability, flexibility and cost. These are the objectives of performance, or in other words, essential criterion for competitiveness. A company needs to please their clients and perform better than their competitors in order to attain a competitive advantage. According to the author, the first step in elaborating a manufacturing strategy is to establish manufacturing performance objectives adapted to the needs of the customers. Likewise, the author proposes a classification which helps determine the relative significance of each performance objective for groups of products, according to the client’s vision (SLACK, 1993, p 179 and 180): objectives which result in sales. The main indicators of performance considered by the clients in their decision to buy are; qualifying objectives, performance considered as a pre-requisite for the consumers to consider the company and the
product; and, less important objectives, those in which consumers most rarely consider in their purchasing.

According to Slack (1993), it is important to identify the competitive criterions prioritized by the clients, as well as the performance of the company compared to their main competitors in these criterions. This information is the base to determine the priorities for the manufacturing strategy. “Neither the classification of the objective’s importance, nor of the performance alone can establish priority”. (SLACK, 1993, p.183).

According to Hayes and Upton (1998), different clients are attracted by different attributes. Choosing a product or service could be based on price, quality (in terms of performance, characteristics or appearance) flexibility, quick response to needs or the level of innovation. Satisfying the client’s perceptions is the main guarantee to reach an important competitive advantage.

3.4 The Evaluation of the Performance of the Supply Chain

Research shows that some companies that still have not become operational, some even have not understood the concept of supply chain management. The result of the research done by Spekman et al (1998) shows that the participants of a supply chain do not share the same views about advantages from the supply chain management. According to the results, partners in a same chain do not have the same views and do not react equally to a group of performance metrics.

Van Hoek (1998) points-out that the supply chain management is characterized control based on a web of relations and integration of processes among functional, geographic and organizational interfaces. According to the author, the modification in the way supply chains are controlled
(which ceases to be based on property and vertical integration to become based on a web of relationships among interfaces), shows the importance of developing research about systems of evaluating performance in supply chains.

Van Hoek (1998) argues that the new characteristics which configure supply chains have an effect in the evaluation of performance of the activities developed in them. According to the author, traditional measurements of performance could not be applicable to this new reality. Therefore, the traditional ways of evaluating performance would need to be abolished and thus creating new measurements and systems of evaluating performance in mature supply chains.

According to Beamon (1999), research about this theme is usually focused on the analysis of the systems of performance measurement which are being used to analyze supply chains. These performance measurements are divided and studied in categories, and, based on these categories general rules or models are established in which measuring systems could be developed for other types of systems.

Gilmour (1999), on the other hand, asserts that the study of the performance of the supply chains is traditionally marked by the emphasis in logistic activities. The fact that companies are becoming more focused on the client is turning the focus of study and performance measurements of the logistic activities to the focus of the ability to generate value for the customer. It is important to note that the turning of this focus to another direction does not imply that there is no need to use operational measurements linked to the logistic performance. It establishes the need to develop a new group of metrics which will enable to evaluate how much the processes of the supply chain contributes in giving the customer more value.

Van Hoek (1998) presents three stages that can be fundamental for the development of a new approach to measure and control supply chains: the extension of the definition of a chain; the
development of new measurements and benchmarks based on these measurements; and, the
development of tools which can help the implementation of a new approach to measurement.
Beamon (1999) shows two ways to analyze and evaluate the efficiency of systems of
performance measurement, whichever they may be, through the existence or not of some
characteristics, and through benchmarking. The characteristics, which according to the author,
are found in efficient systems of measurement and which could be used to evaluate these systems
are: (a) capability of inclusion, given that all aspects are measured, (b) the universality, which
allows comparisons about different conditions of operations, (c) the ability to measure, necessary
data can be measured, and (d) the consistency which implies in the knowledge of knowing if the
measurements are consistent with the objectives of the organization.
Caplice and Sheffi, 1994 (cited by MCINTYRE et al, 1998) affirm that a good metric has the
following qualities: (a) validation, if reflected by the measured process, (b) robustness, if
confirmed by its general approval, (c) utility, if it is easily understood, (d) integration, if it
promotes the synchronization among functions, (e) economy, if it aggregates more value than
cost, (d) compatibility with other information systems, (e) sufficient level of detail, and, (f)
behavioral soundness; the measurement which aligns the actions of people with organizational
objectives.

4. Methods and Procedures of Empirical Research

Allow us to consider the small accumulated and systemized knowledge about management, and
more specifically, about the appraisal of the performance of chains, especially in Brazil, which
gives us the foundation of this study that is based in qualitative research, through an exploratory
method (PARASURAMAN, 1991). Having this considered, the research design adopted for this research was exploratory, by means of using the case study method (YIN, 2001, p. 19 e 20).

The unit of analysis considered in this case study was performance measurement systems in a meat and industrialized poultry products supply chain in Brazil. The supply chain, object of analysis, was mapped and delimited using a company that represents the industrial macro-segment, henceforth denoted as a focal company (MÖLLER e HALINAM, 1999). It is important to highlight that when the focal company accepted to collaborate with the interviews, granted access to their plants and industrial information, asked for their brand, logo and company name to be omitted. Therefore, the name “F Company” or “focal company” was adopted as a way to identify the origin and description of data collected during the field research that are mentioned in these thesis.

The theoretic reference and the researched concepts provide a foundation to this project. Yin (1993, p. 3 e 4), presents the significance and the role of the theory in case study. In this project, the role of the theory was important for the selection of the case to be studied, for the development of the case study project, and to establish the foundations of the analysis and the empirical evidences.

After elaborating the protocol of the case study, semi-structured interviews were conducted with directors, managers and technicians of the focal company. A total of 38 semi-structured interviews were tape-recorded, adding up to a total of 30 hours of recordings. All interviews were conducted in a period from October 2002, until April 2003.

This project used two alternative forms of research. The first was deduction, where the theories were considered. The second looked for direction and evidences in empiric managerial practices (Hunt, 1983). The analysis of the data was realized in two steps, of which in the first step an
internal case analysis was made (EISENHARDT, 1998). The second step of data analysis was executed under different perspectives with the intention to increase accuracy and reliance in the theory. The tactics adopted were for the interpretation of the data in this second phase and the selection of categories or dimensions according to the research problem and, based in the theoretical framework of this paper, the identification of variable concepts that may apply to the understanding of data (EISENHARDT, 1989).

After all recorded interviews were transcribed, the interviews were reviewed and a first edition was done which included the researcher’s notes that were taken during the research. On a second occasion, a new edition of the interviews was made, to group the different data collected according to the themes analyzed of the study case protocol. Afterwards, a third edition was made to group and deal with the different interviews, trying to identify standards among the answers. Hence, a database was created for each interview category and number of questions. Answers to the same question were grouped to form a single answer. Passages transcribed from the interview were put in quotes.

5. The Presentation of the Empirical Research’s Results

5.1 Supply Chain Management: the focal company’s perspective

Upstream in the supply chain, the focal company operates with production vertically integrated, with own operations in three of the four macro-segments considered in this project: animal-food plant, matrix chicken granges and incubatory and aviaries, slaughterhouse, processed and industrialized poultry plant (Figure 1).

In the poultry chain of Brazil, the so called model of integration prevails, were the granges and the aviaries are owned and managed by third-parties called “integrated”. Long-term contracts are
signed of exclusive supply among the granges and the companies which produce poultry. The focal company has some matrix chicken granges, but most of them operate along the integrated model, therefore the focal company is only responsible for the matrix chickens after they are 21 weeks old, when they begin the egg production. The focal company supplies the animal-food, the medication and the technical assistance to all of the integrated. The focal company has six incubators, but also uses four third-party ones which operate exclusively for them.

Figure 1 – Poultry Productive Chain of the focal Company

Source: PEREIRA e CSILLAG (2003)

All of the poultry aviaries are managed by integrated, adding to a total of 1865 aviaries. There are many different internal controls which influence the payment of the integrated: temperature control, water control, animal-food consumption, death-rate control, pest control etc. The aviary is the last process of the so called “farming” stage and represents 70% of the company’s costs, including the cost of animal-food. Included in this 70% correspondent to farming are the raw-material purchased by the headquarters. This purchase is done strategically so that the purchased units have little usage. The most important basic materials are the corn and processed soy which are 85% of the cost of the animal-food. There is a small percentage left for the production to influence in the price of the product; managing the cost and the productivity. The slaughterhouse is also owned by the focal company. There are seven plants located in different regions and represent 30% of the costs of the company. The company has an exclusive processing operation.
for poultry and another for the industrialization of poultry and pork. A part of the production in the slaughterhouse is sent as raw material to the plant of processing and industrializing.

Downstream in the chain the company operates with a variety of channels of distribution. For the international market, they operate through traders and sometimes with industrial clients overseas. In the internal market they sell to retailers, whole-sellers and distributors which are responsible to supply for the smaller retail market. The products whose destination is the national market are sent to the distribution centers (DC), and after they are sent to whole-sellers, retailers and distributors, or when working with bigger volumes, they leave the plant and go straight to the buyer. The most part of the distribution for the internal market is done thorough big chains of whole-sellers and retailers.

By analyzing the results and improvements presented by the focal company, it is possible to say that the productive chain, (the upstream supply chain) has achieved with great success the objectives to increase and lower the production costs. It is probable that these results will be a direct consequence of the business model which prevails and characterizes the poultry chain ever since it began in Brazil. According to the interviewees, the chain is completely coordinated and controlled expressly upstream.

### 5.2 The Logistics of Basic Materials and Finished Products

The logistics in the productive chain of the focal company is the displacement of basic materials, raw materials and finished products. One could divide the logistics of the focal company into four groups: supply, farming, products for the internal market, and products for the international market:

a) supply logistics: supplying raw-materials and basic materials,
b) farming logistics: transportation during different processes. Includes the concerns and decisions related to freight, fleet, distribution centers, and, according to the interviewees, stock management in the productive chain,

c) logistics of the internal market: industrialized products and the technical support;

d) international market logistics: responsible for the transportation of the containers until the port, and placed in the terminal for containers.

The transportation which take place in the productive chain of the focal company involve the following fluxes: transportation of the basic materials to the animal-food plant; transportation of the chicks and the matrix chickens to the reproduction granges; transportation of the 21 days old matrix chickens from the reproduction granges to the production granges; transportation of the eggs into the incubatory; transportation of the one day old chicks to the aviaries; and, transportation of the live chicken to the slaughterhouse. Parallel to these displacements, there is also the transportation of animal-food to the matrix chicken granges and aviaries (Figure 4).

Figure 4: Fluxes of basic materials and raw-materials in the focal company’s productive chain
5.2 Systems of Evaluating Performance

From this point on, some specific components that guided this research are reconsidered, and, are attempted to be answered while the results of the empirical research about the system of evaluating performance in the analyzed supply chain are presented. The main question of the research will be answered in the conclusion.

Q1 – Is there an established system to evaluate the performance of meat and industrialized poultry products supply chain in Brazil?

Q2 – What are the characteristics of the systems used to evaluate the performance of the meat and industrialized poultry products supply chains in Brazil?

The system to evaluate does not involve only the indicators (the object to be measured), therefore some of its components are: the communication, what is formal, what is not formal, the frequency, etc. The results of the analysis of the data collected prove that there is no formal system of performance established to measure the performance of all of the analyzed meat and industrialized poultry products supply chain, or that is capable of evaluating in an integrated manner the activities and processes involved upstream, or the ones developed downstream.

The evaluation of the performance in the analyzed poultry chain is restricted to the productive chain and is done based on every step of the chain; every single part considered. It is possible to say that the evaluation is done for every operation. According to the interviewees it is important to consider the fact that the poultry chain companies work with live animal, which results in having to evaluate the products in every step of the process which can be called “points of performance”. He believes that it is not possible to make a general evaluation of the process for there will still be many gaps.
The system of measuring performance is formal and clearly defined in each link only for the productive chain, which goes from the basic materials until the slaughter, and is controlled by the focal company. The evaluation of the performance happens in each link of the chain, which works as if all of the process were client-supplier based. In other words, the evaluation is done every step at a time, every process considered externally and internally in every company which compose the productive chain.

Once the data gathered during our interviews is analyzed, it is possible to imagine that the chain, compared to the performance evaluation, is divided into three large processes: farming, production and commercial. One of the interviewees mentioned the existence of an operational chain, in which a follow-up is performed as well as a control of the specific indicators of the productive process done in the field. There is also a process chain, which measures and controls industrial indicators, as well as a performance chain which controls the financial results of the company.

If the productive chain controlling system is analyzed (part of the farming) it is possible to verify that there is a strong system established, with clear criterion and that are constantly monitored. According to the Superintendent of the Southeast branch, in general the weakest evaluation of the chain happens in the process of giving the integrated the chick to be grown, because it is the headquarters who gives them the chick. The integrated evaluates the chicks and complains about defects or problems, but their evaluation of the chicks is not thorough enough to refuse the shipment. However, if the technical assistance or the headquarters identifies a problem which could affect the profit of the integrated, the focal company takes some actions to compensate any loss; this is part of the contract.
There is a monitoring system which controls the productive chain to assure the accurate information about the product during the many steps of growing the chick, producing animal-food, production, slaughter and processing the meat. In each step of the productive chain there is someone responsible. There are two indicators which are linked directly to the technicians, others which are the manager’s responsibilities and others which are analyzed by the headquarters. The company controls and follows the costs of each phase of the process, given that the final cost (including the cost for commercializing and distributing the product) is a responsibility of the headquarters (corporate). In general, the evaluation and/or its results are supervised by technicians of field operations and/or employees of the industrial operations and distribution of the focal company. He or she centralizes all of the information and is responsible for the evaluation and control of the results, and for defining all of the actions. Normally the employees are trained to perform such a task.

During the many steps of the farming process, there are people responsible for the processes and people responsible for the general results. The “owner” of the productive chain, the responsible for all of the farming process, from the purchase of the chicks until the slaughter of the adult chickens, is the farming director and manager in the regional branches. The focal company has three senior chairmen (corporative) and managers of departments in the branches which are responsible for the local production.

Besides the information system established in the company, there are public speeches and gatherings to promote exchange of information among the branches and the headquarters. According to the interviewees, the work of evaluating is totally supported by teams and done in the fashion of workshops. Once a month the teams gather with the directors to discuss market tendencies. When something changes in the market, for example, an increase in the price of the
soy oil, the animal nutrition team works to find and alternative substance to use. All of the efforts are directed to always maintain the same price of poultry in the market. These gatherings are called workshops. There are many types of workshops in the company, such as nutritional workshop, farming workshop, and industrial workshop, and this year a regional branch workshop will be created. The objective of the branch workshop is to create an opportunity to analyze the branch and to verify what can be done to improve the branch’s productivity and profitability. The intention is to also promote the exchange of experiences among branches, a sort of internal benchmarking. If a branch has a better performance, the company tries to understand the reasons for it and apply that model to the other branches.

There are two types of consistent controls to verify if the product was made according to the needs of the client and if there were any internal losses. The company performs a meticulous evaluation of the quality characteristics per product of the chain. The procedures adopted in the different processes of the productive chain are directed by a series of rules and proceedings which will result in the desired performance of the focal company.

Q3 – What criterion or indicators of performance are used in the evaluation of meat and industrialized poultry products supply chains in Brazil?

The actions established upstream are fuelled by performance objectives established by the focal company. The procedures adopted in the different processes of the production chain are guided by a series proceedings and rules that will result in the desired performances objectives. According to the managers interviewed, this is decisive for the competitiveness of the product in the international market. Among them there are some which deserve to be highlighted:
- Animal well-being: the productive chain analyzed, leads by the focal company, was one of the first companies to implant the “animal well-being” from the United Kingdom Federal Animal Welfare Council to their egg, chicks and chicken production system;
- environment: rigorous control of temperature and humidity;
- aviaries hygiene and standardized handling: involves employees and technicians of the focal company and integrated;
- breed: the selection of the breed reflects in the final product;
- animal-food: 70% of the cost of poultry;
- strategic location: direct access to regions which produce grains; availability for farming soil; favorable climate; two corn harvests per year; alternative supply of corn and soy from neighboring countries.

The system of measuring performance is formal and clearly defined in each link of the productive chain; from the basic materials until the slaughter. There is a tracing system, where the control is maintained during all of the productive chain to assure accurate information about the product during the many phases of growing the chicken, producing animal-food, slaughter, and processing.

The evaluation of the performance happens in each link of the chain, which works as if all the process were client-supplier, in other words, the evaluation is done one step at a time, process by process, and internally in the companies which compose the chain. Most of the evaluations and/or results are supervised by technicians of the focal company. The focal company is responsible for all of the decisions.

There are large numbers of operational indicators established along the productive chain, being that most of them are known by all of the upstream links and controlled by the focal company.
The main indicators connected to the product and analyzed by the focal company are: cost of the chicken, chicken weight caused by the food, death-rate, daily weight-gain, chicks per chicken, average weight, and partner compensation.

Quality indicators are mostly technical specification linked to the product and to the bio-security of the process. In part of the supply chain which is coordinated by the focal company, from the granges to distribution, it is possible to notice that there are operational indicators normally connected to quality and productivity of the product in each phase; and financial, focused on the costs of the productive processes (Box 2).

Box 2 – Main indicators of performance in each link of the productive chain

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<th>Link</th>
<th>Key Indicators</th>
<th>Criterion Classification</th>
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<tr>
<td>Reproduction</td>
<td>Bio-security, Average weight, Uniformity; Death rate, Weight gain, technical assistance.</td>
<td>Operational</td>
</tr>
<tr>
<td>Grange</td>
<td>Bio-security, Average weight, Uniformity; Death rate, Weight gain, Cracked eggs, Broken eggs, Production, Eclosion, technical assistance</td>
<td>Operational</td>
</tr>
<tr>
<td>Incubator</td>
<td>Bio-security, contamination area, contaminated egg, Eclosion.</td>
<td>Operational</td>
</tr>
<tr>
<td>Aviaries</td>
<td>Average weight, productivity death rate, weight gain</td>
<td>Operational</td>
</tr>
<tr>
<td>Slaughter/Cut</td>
<td>Stock, utilization of parts, costs of production.</td>
<td>Financial, Operational</td>
</tr>
<tr>
<td>Processing</td>
<td>Costs, stock, reliability of delivery, quality, supplying demand</td>
<td>Financial, Operational</td>
</tr>
<tr>
<td>Stock</td>
<td>Direct costs, stock, life of the product, fleet.</td>
<td>Financial, Operational</td>
</tr>
<tr>
<td>Distributing</td>
<td>Displacement, time of delivery, cost</td>
<td>Financial, Operational</td>
</tr>
</tbody>
</table>

Source: elaborated by the authors

The usage of operational and financial indicators confirms the indicators in the researched bibliography of the evolution in the systems of evaluating performance, which was marked especially by the inclusion of pre-established operational indicators and highly utilized financial indicators.
The main indicators linked to the product analyzed by the focal company are: cost of the chicken, weight gain related to the food, death rate, average weight gain, chicks per chickens, medium weight, sick chicken and partner’s compensation.

According to the data collected, it is noticed more that the productive chain is downstream (in the links were the company acts with partnerships (or integration)), the greater will be the emphasis in the operational indicators, and less on the financial indicators. This phenomenon seems to be a result of the model of compensation developed by the focal company, which relates the compensation of partners with productivity, and consequently, with operational performance.

As far as the final consumer, the results are measured and analyzed individually by the companies of the chain, given that the focal company bases this on their customer service. The difference of this system from the evaluation based on customer service is that although the customer service is an internal and exclusive department of the focal company, the model of integrated management allows the customer service agents to learn about the processes of the chain as a whole, and not only the operations of the focal company.

The results of the empirical research show that there is no system of performance formally established to measure the performance of all of the supply chain, or that evaluates in an integrated fashion the activities and processes developed upstream with the ones developed downstream.

Financial performance is considered by all the interviewees (with the exception of technicians who focus more on bio-security matters) as a decisive and fundamental matter for the success of the productive chain. The interviewed directors and managers believe that the best performance
indicators for the supply chain could be the same ones used to evaluate the performance of the focal company: profitability; the market accepting new products; and participation in the market. The observations and interviews show that the animal well-being and the hygiene control are indicators that, in the case of an agribusiness chain, could be used to evaluate the performance of all of the chain in relation to the demand of the market. Altogether, considering the characteristics of the chain and the product, some general indicators could be: productivity, quality, logistics and distribution, cost, and integration. Therefore it becomes necessary to develop specific metrics for each category.

6. Conclusions
The results of this study show that the productive chain management model used by the large meat and industrialized poultry products producers seem to have a significant impact in the excellent results obtained in Brazil. The chain is strongly coordinated upstream therefore allowing a better control of all of the productive process, besides improving the communication and decision-making among partners in the chain. The results are evident in the criterion of quality, hygiene and costs.

In fact, many companies that compose the analyzed chain can already establish and identify a series of indicators for the diverse activities and processes conducted internally in the organization. Nonetheless, what the companies need to search for, in reality, is the final result, not only of their internal processes or of the activities under their responsibility, but also the final results measured by the value perception of the final customer. Therefore, there should be much caution when elaborating indicators that will thoroughly present the global results. In the day-to-
day business management and operations, the companies wind up loosing control of details, therefore using a series of “financial and operational indicators”.

In the case of the meat and industrialized poultry products supply chain, business is not measured by the rate of eggs-hatching or by the rate of weight gain. In the end what matters is what has been sold and the performance evaluated by the customer. Usually in the products produced and distributed in the market the local indicators do not matter, but the impact of this indicator in the final result of the chain is what matters; when the customer has access to the product. The best indicator or performance in an isolated part of the chain will do no good if when the product reaches the market and the company is not able to transform this local performance into the final result.

The development of the supply chain is a result of the efforts of all the preceding stages which connect to produce and make the service/product available to the market. The first evaluation necessary is to know if the attributes required by the client are corresponded by the choices and actions of each step of the supply chain. Thus, we would like to keep in mind the main question that guided this research. We will try to answer it along the fashion in which the main conclusion about the evaluation of the performance of the analyzed food chain was presented.

**Main Question: How is the performance of the meat and industrialized poultry products supply chain in Brazil evaluated?**

The results of this study show that the chain management model used by the main poultry producer presented excellent results in the country and internationally. The strongly upstream oriented chain allows a greater and better control of all the productive processes and improves the communication and decision-making among the chain’s partners. The results are evident when it comes to quality, hygiene, reduction of costs and traceability.
There are signs that the poultry supply chain analyzed has already achieved its objectives of lowering costs and improving the efficiency of the productive process throughout the chain, but only for the part denominated as productive chain, which although has all the traditional operations of adding value throughout the chain (for it is where the process of transforming the raw-materials into products), is not able to attend all of the requisites of the market, specially in those that modern companies seek to have the advantage of the competitive edge: adding value through services and inherent attributes.

Some of the acting agents placed upstream of the supply chain usually act isolated and not integrated, consequently trying to achieve better results for their business individually. The current relationships among downstream companies to the focal company, which act as a channel of distribution in the internal market, are usually marked by the transactions made with each new order and are characterized by exasperating negotiations. Even when in the channels that work with contracts of exclusiveness with the focal company, such as the distributors, it seems as if there a difficulty in having a good integration and sharing of objectives, considering that the priorities and strategic objectives of the focal company are directed towards the external market which guarantees them larger profit margins.

It is correct to say that without an orientation to integration (proposed and necessary for the implantation of a philosophy of supply chain management) it is not possible to establish an evaluation of performance which will provide the real measurement of all of the supply chain. In this case, the performance evaluation is fragmented and only shows part of the results of the supply chain (noticeably the performance centered on the productive operations and the adding of value which happens from the supply of the basic material all the way to the industrialization).
Based on the results and the premise adopted in this research, it is possible to hypothesize that the implantation of a supply chain performance evaluation system requires that first of all, there be the relationship management based on the philosophy of customer services. If the relationships of the chain are managed, it would be possible to establish indicators that would allow the evaluation of the supply chain as a whole, keeping in mind the adding of value for the final customer of the diverse products offered by the chain.

Indicators are numbers that allow the improvement and adjustment of the system. It is not just a direct relation between two variables. In the case of a supply chain, the indicators should conduct the improvement of the system as a whole, not only in parts.

7. Suggestions for future research

It is believed that this project contributes to the construction of a theory about management and performance evaluation of supply chains, since the study shows the same results between theory and practice, culminating with the proposition of some hypothesis that may be verified in future research, and, a number of questions that may serve to stimulate the development of new researches in the area.

However, there is still some questions that have to be answered referring to the performance of the supply chain, in order to allow these evidences to be tested and proved. Future studies could search to understand in detail the downstream relations of the chain, of which the operations and relationships still do not present the necessary characteristics to manage supply chains. Considerations about the displacement of power in the channel of distribution, from the plant to retail close to the final consumer, would bring the opportunity to advance and understand the importance of supply chain management to the web as a whole.
Comparative studies with other agribusiness chains that adopt different models than the ones presented in this study could contribute to debate some concerns that still persist: are these the results of the nature of the processed product, or of the model of chain management adopted? This model of chain management, emphasized on integration and coordination, sets a standard for supply chain managements as a whole? Is it possible to adopt this model with the downstream companies of the chain?

9. Bibliography


