

## Strategic management indicators for internal logistics: a proposal based on the Balanced Scorecard for an automotive sector company

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### Summary

*The article aims to contribute to the evolution of management models for internal logistics by proposing a strategic control system for the contemporary competitive environment. The complexity of the current business context forces managers to resort to a variety of control and management tools to maintain high levels of operational performance and sustained corporate growth. Old management tools such as financial and internal process management techniques that are restricted to the control of tangible results have become inadequate. The complexity of operations demands the control of tangible and intangible results; increased information flows and the complexity of businesses and markets call for a more developed and comprehensive system for strategic control. The Balanced Scorecard may be used to produce new strategic indicators for the area of internal logistics, a primary activity in the value chain, which demands a significant share of company resources. Strategic control of this activity is necessary to ensure future results, and not only to reflect upon past results. It is essential that the indicators are aligned with corporate strategy. It is concluded that the reformulation of the strategic indicators contributes for a better alignment between internal logistics and corporate strategy.*

*Keywords: Balanced Scorecard; internal logistics; automotive sector.*

### 1. Introduction

In increasingly competitive markets, it is crucial to evaluate how companies are structuring their strategic indicators. Organized methods to measure results considering the various relevant perspectives can bring competitive advantages that are often overlooked by the organization. Hence the importance of studying and analyzing how organizations are using strategic control tools to achieve sustainable development and competitive advantages in relation to their main competitors.

This article aims to analyze and to propose strategic control indicators for internal logistic processes by means of a case study. The analysis of the current situation of indicators and the proposal of new controls based on the *Balanced Scorecard* method reveal the potential for improvement, regardless of the type of organization. The analysis of current indicators was necessary to verify whether they actually expressed company strategy as well as their adequateness to ensure good levels of control and performance for that set of activities. The proposal of new control indicators matches the four *Balanced Scorecard* perspectives, aiming for a management model that is more comprehensive, up-to-date and coherent with corporate strategy and with the contemporary competitive context.

## **2. Theoretical Foundations**

### **2.1 Competitive advantage in the age of information and knowledge**

Organizations are facing a highly competitive environment in the so-called age of information and knowledge. The current period is characterized by powerful information flows, the increasing importance of knowledge and decreasing geographical barriers for business. These phenomena have changed the corporate world as new competitors and new market opportunities arise, as well as numerous difficulties related to organizational planning and management (KAPLAN; NORTON, 1997).

The creation of the value chain involves complex decisions, which are constantly affected by the speed of information flows and the rapid changes in values related to clients and stockholders. Business investors seek to minimize risks by reducing the time horizon that is required for return on investment. Those who purchase products and services seek for differentiated opportunities to fulfill their needs and desires regarding quality, cost and time. The resulting pressure on organizations forces them to search constantly for new models or strategic management systems that enable them to manage efficiently their results (HAMEL; PRAHALAD, 2005).

Planning difficulties can be transformed into development opportunities and new management models. Strategic management systems should provide a comprehensive view of the future and help to prepare people to overcome oncoming challenges. A global analysis of the company, considering its tangible and intangible assets, is essential to obtain greater profits and sustainable development in the short, medium and long run (KAPLAN; NORTON, 2004).

### **2.2. Logistics**

Porter (1987) characterizes logistics as an integral element of the enterprise value chain, relating both to primary and support activities. Moeller (1994) highlighted the importance of logistics as competitive advantage as a search to promote cost, quality and time differential advantages. Ballou (1996) classifies logistics as a strategic operational function with a high power to add competitive benefits for organizations, pointing out the need deliver the right product to the right customer, in the right quantity and conditions, at the right place and time, at the right cost. Bowersox and Closs (1996) present logistics as an administrative function, describing it as the project and systems management to control flows of material, products being processed and stocks of finished products to support the strategy of a business unit. Christopher (1997) points out that it took long for companies to realize the importance of logistics for developing competitive advantage against competitors.

Moeller (1994) and Alvarenga and Novaes (2000) show the evolution of the concept of logistics as it correlates with the environment and focus of economic sectors, pointing out the adaptations of logistics as the business environment becomes more dynamic. In the beginning of this century, logistics is based on systems theory, meaning that it depends both on the external and internal environment, and therefore it becomes inefficient if it is regarded as an isolated element. Table 1 summarizes the evolution of the concept in the last decades.

Period	Environment	Sectoral Focus	Logistics Focus
70's	Availability of Capital	Profitability	Production
80's	Competition	Quality	Purchasing/Production/Sales
90's	Globalization, Partnerships, Ecology	Time	Business Process
2000	Globalization, Partnerships, Ecology	All processes	Systems Theory

Source: Adapted from MOELLER (1994); ALVARENGA and NOVAES (2000)

Table 1: Trends in business environment and focus of logistics

In Brazil, logistics is becoming a large-scale activity that has evolved rapidly in recent years. It is estimated that the 500 largest industrial companies in Brazil spend approximately R\$ 39 billion per year in logistics, which is the equivalent, on average, to 7 percent of their revenues (FIGUEIREDO *et al*, 2003).

The importance of costs of logistics in relation to revenues has received increasing attention. As it becomes a transversal activity within organizations, the budgets for departments of logistics are growing. In the largest Brazilian industries, the second largest source of expenditures with logistics relates to warehousing activities, which correspond to 21 percent of the total (FIGUEIREDO *et al*, 2003).

Moura (1997) singles out some important concepts that define internal logistics. When focused on production, internal logistics is responsible for input of products, storage of raw materials, internal transportation, storage of partly finished and finished products, preparation of orders and return of packaging to suppliers. In summary, all the management and movement of materials within industrial units corresponds to internal logistics.

Expenditures with internal logistics account for a significant share of total costs. According to Moura (1997), costs of logistics represent 15 to 25 percent of total revenues for most companies. Within these costs, there are expenses related to flows of materials and transportation as well as internal movements of material and stocks. Each process of internal logistics must be controlled to achieve competitive advantage.

### 2.3. *Balanced Scorecard (BSC)*

Kaplan and Norton (1997) have developed a system of strategic indicators called *Balanced Scorecard*. It is based on four different, yet integrated, perspectives, encompassing measures of financial results, the clients, internal processes and learning and growth. The authors argue that such indicators make it possible to clarify and create consensus on strategy, to communicate strategy to the entire company, to align departmental and personal goals with overall strategy, to associate strategic objectives with long-range goals and annual budgets, to identify and to align strategic initiatives, to support periodic and systematic strategic revisions, and to obtain feedback to deepen knowledge about the strategy and potential for its improvement.

The *Balanced Scorecard* is designed to measure tangible and intangible results in a balanced manner. In order to develop strategic indicator, it is necessary to define first, in clear and objective terms, the corporate strategy, including its mission, definition of values and vision. Then the strategic maps are developed and the *Balanced Scorecard* is applied. The previous steps are essential for it to express precisely the corporate strategy in quantifiable results.

For the application of the *Balanced Scorecard*, it is important to establish explicit relations between objectives and the measures that will be obtained in the various perspectives, so that they are adequately managed and validated. Strategy, the base for balanced strategic indicators, is a set of hypotheses based on cause and effect relationships. The absence of those relationships would contradict the idea of balanced indicators.

Long-term financial goals provide the focus for the goals and measures of the other *Balanced Scorecard* perspectives. Any measure that is selected should be part of a chain of cause and effect relations that culminate in improved financial performance. One of the most important factors for establishing the measures of the financial perspective is their adjustment to strategy. Therefore, they take on a double role: to define the financial performance that is to result from strategy, and to serve as the main goal for the objectives and measures of all the other perspectives in the *Balanced Scorecard* (KAPLAN; NORTON, 1997).

In the “customers” perspective of the *Balanced Scorecard*, companies identify the segments and markets in which they want to compete. Those segments represent the sources of the income component for the company’s financial objectives. The essential measures in this case can be customer satisfaction, loyalty, retention, capture and profitability. Companies that fail to translate their customer values and future desires will not be able to reach sustainable development.

For the “internal processes” perspective, business executives identify the critical processes to achieve the objectives of customers and stockholders. Companies usually develop objectives and measures for this perspective after the formulation of objectives and measures for the “financial” and “customers” perspectives. That sequence of activities allows companies to focus the internal process measurements on processes that will lead to the objectives of customers and stockholders. Every internal process should promote sustainable development and that in turn depends on the satisfaction of stockholders and clients (KAPLAN; NORTON, 1997).

The fourth perspective proposed by Kaplan and Norton (1997) is the organizational “learning and growth”. The objectives of this perspective provide the infrastructure for the achievement of the objectives established in the other three perspectives. Within this perspective, the items to be evaluated include the abilities of employees and information systems, motivation, training and strategic alignment.

### 3. Methodology

The point of departure for the study is the current situation of control indicators, from which a new proposal was designed. It is based on the principles of a strategic control system, such as the *Balanced Scorecard*. A case study was used as the method to obtain predominantly qualitative information.

The data were obtained from internal logistics departments of two assembly units of a single industrial complex in the automotive sector. One unit assembles automobiles and the other produces utility vehicles. Internal logistics encompass similar activities independently of the respective assembly unit, taking into consideration the peculiarities of each assembly plant.

The sources for data collection were company documents originated from the detailed objectives and action plans (D.O.P.A.) and from management tools. The strategic objectives

and strategic maps for the internal logistics sector were extracted from D.O.P.A., as well as the strategic indicators and internal processes.

#### **4. Data analysis**

##### **4.1. Current situation of internal logistics in the company**

Internal Logistics is responsible for all the movements of components, from their arrival to the industrial complex to their utilization by the manufacturing sector. It is structured to serve the three plants that are located within the industrial complex, and it employs 165 people. It uses a considerable share of the yearly budget of Logistics, as whole, reaching approximately 6 percent of the total in 2005, which corresponds to about R\$ 12 million.

The main customers of Internal Logistics are the Manufacturing Department and the Department of Component Provision. Manufacturing is the main customer, since it depends on the parts to assemble the vehicles. Component Provision receives the inventories of parts prepared by Internal Logistics, which are needed to confirm the quantities of parts that are found in the management systems.

Internal Logistics is responsible for the following processes:

- a) Receiving: unloading of trucks and containers, movement of parts, checking of quantities of parts.
- b) Storage: movements of materials, addressing of parts in stocks, and quality control over the operations (stock auditing).
- c) Counting of parts or inventories: cyclical counting of parts.
- d) Supply if consumption points: movement of materials from stocks to consumption points, addressing of parts in the production line, and quality control over the operations (auditing).

##### **4.2. Detailing of strategic objectives**

The D.O.P.A. (Detailing of Objectives and Action Plans) is a system of internal control that is used by the company to detail the strategy and action plans for all organizational levels. It seeks to translate the strategy into strategic indicators. The system is similar to the *Balanced Scorecard*, and it establishes cause and effect relationships among the different levels and perspectives. The indicators serve as the basis to create the processes that are essential for the development of strategy. Then, the necessary individual competences are determined for the adequate execution of each process.

##### **4.3. Existing indicators in internal logistics**

The existing indicators seek to control only variables that are related to internal processes within internal logistics. There is not an updated, direct connection with corporate strategy, because the company's strategic objectives are revised yearly, and the indicators have not changed for the past four years. There is no apparent concern with financial results, the satisfaction of internal customers, or the continuity of learning in the sector and its long-term growth. There is no cause-effect relation among the indicators, and trend results are also absent. The existing indicators are shown in Table 2.

N	Name of indicator	Perspective	What does it measure?	What is the objective?	Who?
1	Truck Reception	Internal process	Number of arriving trucks beyond scheduled arrivals	Identify extra workload in truck reception	Clerk
2	Container Reception	Internal process	Number of unloaded containers	Control arrival of imported materials	Clerk
3	Logistic Incidents	Internal process	Number of open and closed incidents during the week	Identify whether incidents are reported	Stock Auditor
4	Stock Auditing - Assembly	Internal process	Number of audited stock addresses in assembly and number of nonconformities	Ensure quality of stocks	Stock Auditor
5	Stock Auditing – Body shop	Internal process	Number of audited stock addresses in body shop and number of nonconformities	Ensure quality of stocks	Stock Auditor
6	Stock Auditing – Assembly	Internal process	Number of audited stock addresses in assembly and number of nonconformities	Ensure quality of production line	Production Line Auditor
7	Stock Auditing – Body shop	Internal process	Number of audited stock addresses in body shop and number of nonconformities	Ensure quality of production line	Production Line Auditor
8	Number of inventories concluded	Internal process	Number of inventories concluded in the week	Ensure minimal number of inventories	Inventory clerk

Table 2: Current Indicators of internal logistics

#### 4.4. Proposed Indicators based on the *Balanced Scorecard*

The *Balanced Scorecard* provides new perspectives for the control of internal logistics, but not necessarily a greater number of control indicators. That is because the proposed system was developed on the basis of detailed strategic objectives, with a focus on the factors that really add value to the company and to internal logistics. The proposal follows the methodology of balancing indicators by means of cause and effect analysis, beginning with the financial perspective and finishing with the development of the learning and growth perspective.

The process began with meetings with managers of the sectors that are internal customers of the internal logistics sector. The “wish list” from the customers was then compared with documents from company headquarters that establish the scope of action of internal logistics. The analysis of both lists led to the development of a single list of the responsibilities of internal logistics and its mission, encompassing the visions of the company and of the internal customers. The D.O.P.A. documents prepared by the directors were consulted to verify the strategy that was determined for logistics. The strategy provided the elements to produce strategic maps, considering the four perspectives, for ten functions that had been previously established: reception of materials, stock auditing, line auditing, management of logistic incidents, inventory, forklift transportation, towing, transportation support, operations management and supervision of internal logistics. The resulting strategic indicators are shown in Table 3.

It becomes clear that a substantial improvement is observed in the contents of the components to be measured. Previously, only data related to internal processes were measured. The proposed system of indicators covers the four perspectives of the *Balanced Scorecard*. Each indicator necessarily requires sectoral control measures that will compose the strategic indicators. If the latter are out of the range of the objective, the sectoral indicators must be analyzed to identify the cause of the deviation. The financial indicator may be used as an example. The unit value added of internal logistics is composed by adding a set of indicators of unit movement value, the value of expenditures with components per unit produced, the value added related to office materials, industrial and safety materials per produced unit, and the value of expenditures with nonconformities of internal logistics per unit produced.

N	Name of Indicator	Perspective	What does it measure?	What is the objective?	Who?
1	Unit Value Added of Internal Logistics	Financial	Cost related to internal logistics per vehicle produced	Control operational costs of internal logistics	Supervisor
2	% of incomplete vehicle assembled and Average minutes line stopped for lack of parts (Internal Logistics)	Customers	% of parts not delivered to clients as scheduled and time production line stopped for lack of parts	Customer satisfaction: manufacturing	Supervisor
3	Range of quantity of inventories	Customers	Quality of inventories	Customer satisfaction: provision	Supervisor
4	Nonconformity on the line and on assembly and body shop stock	Internal Process	Quality of line and stock audits	Ensure correct placement of materials	Supervisor
5	Forecast and realized inventories	Internal Process	Adherence to scheduled inventories – weekly control	Ensure that all parts are inventoried in scheduled week	Supervisor
6	Check 100% of large and small packages	Internal Process	% of packages checked in materials reception	Ensure checking 100% of materials arriving at plant	Clerk
7	Compliance with movement deployment	Internal Process	Time of internal line supply movement routes	Ensure cycle times of forklift and towing equipment to avoid supply delays	Supervisor
8	Accidents	Learning and Growth	Number of accidents	Bring plant accidents down to zero	Supervisor
9	Individual competence measures	Learning and Growth	How many employees underperform, meet expectations or exceed them	Identification of individual competences of each employee in sector	Supervisor

Table 3: Proposed strategic indicators for internal logistics

## 5. Conclusion

The complexity of the age of information and knowledge no longer allows business executives to regard sleepily their internal process indicators such as the so-called *tableau de bord*. Permanent and careful vigilance of all factors that are relevant to their business

activities is mandatory. This comment is pertinent because many business leaders still rely on past information while the future beckons their attention. The data may exist, but many decision makers fail to see them.

The proposed system of indicators is certainly subject to further improvements, but it already represents a substantial improvement in relation to the current situation of the internal logistics sectors in this case study. The focus of the company in its internal processes only provided a myopic vision of the results of that sector. Problems with control of financial aspects are ascribed to the difficulty to obtain data related to the costs of internal logistics. The proposal of balanced indicators can certainly contribute to expand the company's ability to identify its shortcomings.

The proposed indicators for the learning and growth perspective indicate a new approach within the company. Previously, the individual competences of employees had not been analyzed and measured. Using the measurements, it is possible to verify whether upskilling training is being developed, whether they are bringing practical results to the company, and their impact on sustainable development as well.

The customer-oriented vision helps to move away from an internal focus and to envision the broader external benefits of the work that is developed in the sector. A basic marketing lesson – to meet customer needs – appears to be lacking in the internal view of companies. The customer is often seen only as the final customer who buys the finished vehicle, but there are internal clients who also demand quality. A customer-oriented vision is a form to ensure in itself that a good part of the results will be achieved.

This study may be extended and adapted to other organizational settings, given that every organization depends on internal logistics. The improvement of control indicators, even though they depend for the most part on individual strategies of each company, could lead to a basic set of indicators, or guidelines, that any company could use.

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