Application of ECOGRAI/BSC Method for Controlling Logistic Performance: Case of a Moroccan Clothing Company

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Abstract

Logistic performance measurement and management have always been a major concern for enterprises. The Balance Score Card (BSC) is one of the most used tools of performance management. This article explores a conceptual basis for understanding the development of a BSC oriented logistic performance using the ECOGRAI method. The first aim of our contribution is to present the method ECOGRAI/BSC in order to improve logistic performance whereas the second is to provide a methodology for implementing this method in enterprises via a case study of a clothing company.

Key words: Balance Score Card (BSC). ECOGRAI.*ECOGRAI/BSC.* Logistic Performance.

1. Introduction

Under the pressure of the development of new organizational forms (virtual enterprises, extended enterprises, subcontracting, co-contracting...), the globalization of manufacturing and distribution, the expansion of logistic networks, coordination between supply chain partners (Chow et al, 2008; D'amour et al 2007), the use of Information Communication Technology (ICT) (Morana, 2002), of inter and intra organizational communication (Paulraj et al, 2008) appear to be more competitive sources of logistic performance of companies. This fact makes of the assessment and the monitoring of business performance a problem that is not only limited to the interior of the plant and the company but extends also to the whole supply chain process. Performance is a concept that is both fuzzy and multidimensional (Germain, 2004), it exists only if it is measurable by one or more indicators (Chen et al, 2007). Li et al, (2009) indicate that with increased competition, organizations are becoming awarethatit is no longer sufficient to continue seeking the improvement of performance within the company and that it is necessary to prospect for deposits and opportunities across the supply Chain.

In this vision, logistic emerges as an effective and essential solution for the development of collaborative management and the integration of processes starting from the supplier to the final customer (Ducq and Vallespir, 2005) in order to improve the logistic performance of each link, and finally improve that of the supply chain as a whole (Kohet al, 2007). The main objective of this paper is the empirical application of the method ECOGRAI/BSC for the establishment of a balanced score in a clothing company. The new contribution of this paper is two folds: first it considers a new methodology that combines the ECOGRAI method and SCM to evaluate and monitor of logistic performance. Second, it presents a case study of the implementation of this method.

This paper is structured as follows: the first section discusses the main concepts related to BSC. The second section describes the methodology used (ECOGRAI/BSC). The fourth title presents the case study and finally the fifth section is devoted to the conclusion.

2. Literature Review

2.1. The Balance Score Card

The dashboard of a company is a tool used for the synthesis and the visualization of the indicators which are needed to assess the situation in question, suggesting possible actions, and whether remedial is necessary or not (Fernandez, 2000; CeruttiandGattino, 1992). The dashboard provides a real-time analysis of business performance because it facilitates the monitoring of events that cause them, it is a simple consultation and the data are of synthetic nature.

The BSC - proposed by Kaplan and Norton (1996) - is defined as an instrument of control and corrective action in which a small set of indicators is included to allow managers to know the state and evolution of the systems they are operating and to identify trends that will influence a horizon that is coherent with the nature of their duties. The BSC intends to decline the company's strategy through four areas: finance, customer, internal processes and innovation / learning (Fig. 1.).

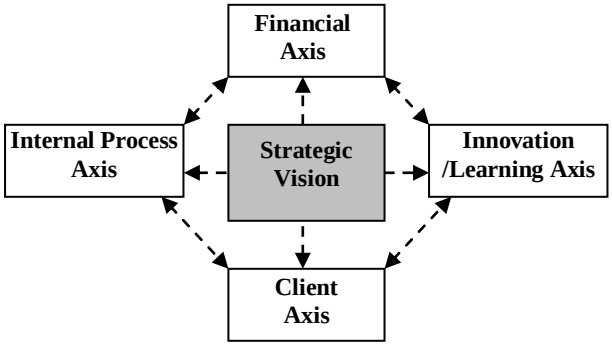

Fig.1. Axis of BSC (Kaplan and Norton,1996)

The BSC is a strategic management tool whose objectives are: (1) To clarify and to communicate the vision and strategy, (2) To communicate and link strategic objectives and measures, (3) To plan, To target and To align strategic initiatives and (4) to improve the feedback and learning (Kaplan and Norton,1996). The process of implementation of the BSC is shown in fig. 2.

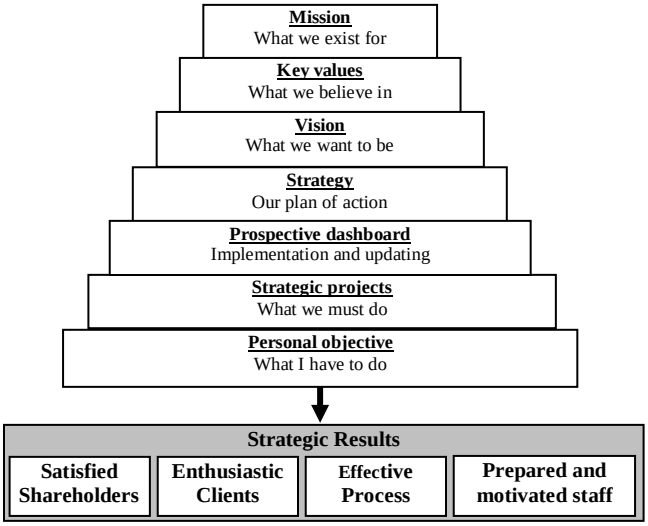

Fig.2. Synthesis of the BSC procedure (Brewer andSpeh, 2000)

However, despite the considerable contribution of the BSC and the interest it brings to enterprises, its limitations are numerous.

The most important ones are: (1) part of BSC is not adapted to the operational level and is intended primarily for senior managers to provide a comprehensive view of performance (Ghalayiniand Noble, 1996), (2) absence of a network orientation (Hiber, 2002), (3) it does not consider performance management and measurement within the perspective of the extended enterprise (Bititci et al, 2005).

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2.2. Ecograi Method

ECOGRAI is a method that enables to design and implement performance indicators systems for organizations (DucqandVallespir, 2005;Bitton, 1990). This method is based on the triplet (variable objective measure) (Fig. 3.) so as to design and implement a system of performance indicators in all centers of power that is focused on evaluation and at the same time coherent with the branching of objectives (Bitton, 1990).

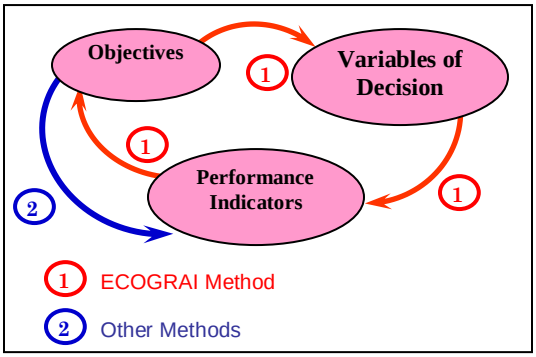

Fig.3. The Principe of ECOGRAI method

The method ECOGRAI (Bitton, 1990) enables, first, to structure the operational objectives in the short term period and that decline from the strategic vision to bind them to variable action or lever actions to achieve these objectives; and secondly, to match these levers to performance indicators for monitoring the achievement of these objectives, and this through the GRAI grid representing the operation process to study as well as the decision centers associated with it.

The ECOGRAI method thus allows to drive performance, to converge the objectives and to assist managers in the decision making process.

Also the ECOGRAI method allows: (1) to use all the features of the ECOGRAI method listed above (2) to classify the objectives and levers according to the logic BSC according to the four axes, and (3) to assign to each couple (goal, lever action) their corresponding indicators for performance monitoring.

The main features of the ECOGRAI method are:

- The recourse to the analysis/design logic using a "top-down" approach and allowing the break-up of the strategic level objectives into operational objectives,
- The use of graphic tools and supports: GRAI grids, actigrams, sheets ...
- A coherent distribution of performance indicators covering the different functions and different decision levels (strategic / tactical / operational),
- The search for a limited number of performance indicators by an original andan integrated approach (Fig. 1), which defines a limited and coherent set of indicators.

The originality of the ECOGRAI method is not in defining performance indicators, but in finding ways of action (decision variables) upon which policy makers can act to achieve their goals (Fig. 4). This ensures that people who are responsible for the evolution of the performance have the tools to do so.

In its latest developments, the ECOGRAI analyzes the coherence of the (Strategic Operational) objectives as well as the developments to ensure the interoperability of decision support.

This analysis is based on the coherence of decomposition diagrams, the coherence of the objectives and on the panels of coherence between the objectives - the decision variables of performance indicators.

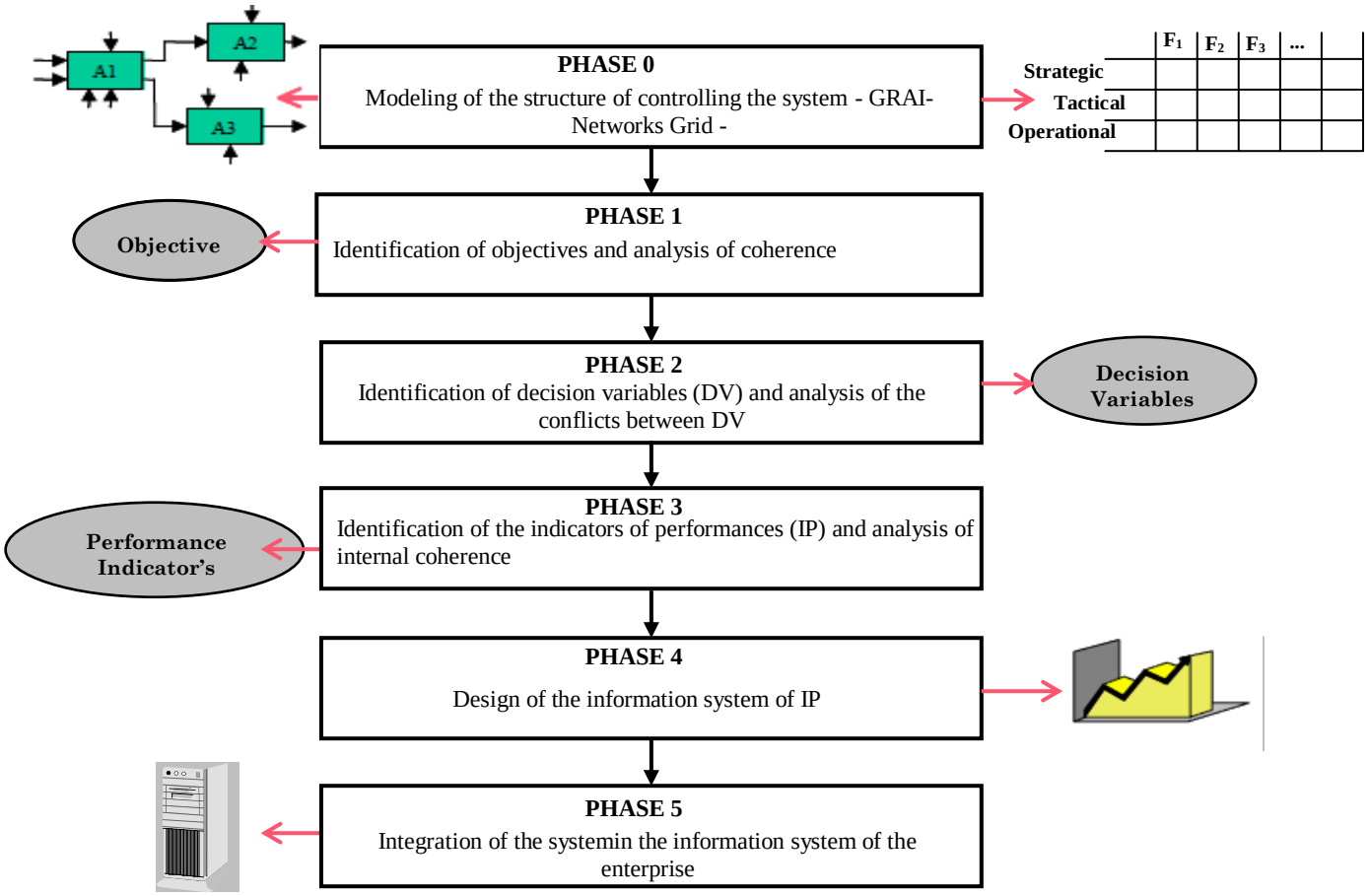

Fig.4. The 6 phases of the ECOGRAI method

3. BSC Implementation methodology: ECOGRAI/BSC Coupling

ECOGRAI method is based on the triplet (goal, action, variable) in order to design and implement a power system of performance indicators in all centres of that is based on the assessment and that is coherent with the branching of the objectives (Bitton, 1990).

The ECOGRAI method (Bitton, 1990), allows to structure the operational objectives in the short term period and that decline from the strategic vision to bind them to action variables or levers of actions to achieve these objectives and to match these levers to performance indicators for monitoring the achievement of these goals, and this through the GRAI grid representing the operation of the process to study and the decision centres that are associated with it.

The ECOGRAI method thus allows to drive performance, to converge objectives and to assist the managers in the decision making process.

Hence, we have opted for the use of the ECOGRAI/BSC in order to: (1) use all the features of the ECOGRAI method listed above (2) classify the objectives and levers according to the BSC logic within the four axes, and (3) assign to each pair (goal, lever action) their related indicators for monitoring performance.

The idea of the BSC implementation process using the ECOGRAI/BSC is summarized in Fig. 5:

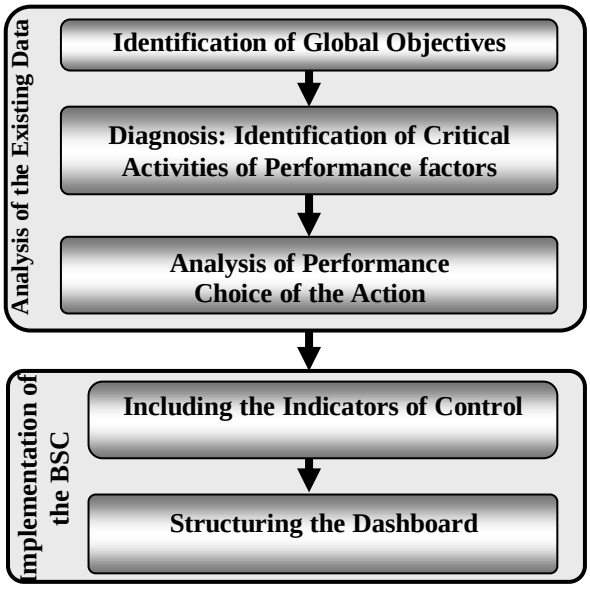

Fig.5.ECOGRAI/BSC Method(Bitton, 1990)

Phase 1: Analysis of the existing data

Identification of the overall objectives:
Before implementing the ECOGRAI/BSC method, it is essential to make a preliminary diagnosis to determine of the overall objectives that decline from the strategic vision of the company.

Identification of critical activities and performance factors:
This step is to define the overall objectives of the company and then break them down by function based on the mapping of the process flow and to study the information obtained during interviews conducted with officials.

Choice of the action variables:
A second decomposition of objectives must be performed; this time a transition is made from the tactical level to the choice of variable action level of the operational level.

Phase 2: Implementation of the BSC

Before the selection of the performance indicators, the classification of sub-objectives or levers according to the BSC logic within the four axis (client, finance, process and learning).
As part of this classification, targets will be included in a chain of cause and effect so that each perspective is based on another as an approach to have a clear vision of the strategy.

Establishment of Steering Management indicators:
Indicators for monitoring performance should be chosen in a meaningful way. Each indicator must meet a set of predetermined criteria, among which we can mention: the ability to deliver information in real time that is linked to a goal, that encourages action, that is easy to perform, and selected in a team.

Structure of the dashboard:
The structure of BSC is performed so that: (1) for each indicator is combined a strategic goal (the goal) and (2) strategic initiatives to be undertaken in the four areas to achieve these objectives.

4. Case Study

4.1. The Company Context:

The company in question is a major Moroccan company specialized in the textile sector that employs more than 1 000 employees. It is located in the industrial neighbourhood of Marrakesh and was founded in 1992 as part of a sub-contract with a French company specialized in producing textile underwear for children and adolescents.
Fig.6, describes the manufacturing process of the company as well as the support services that allow the realization of the finished product.

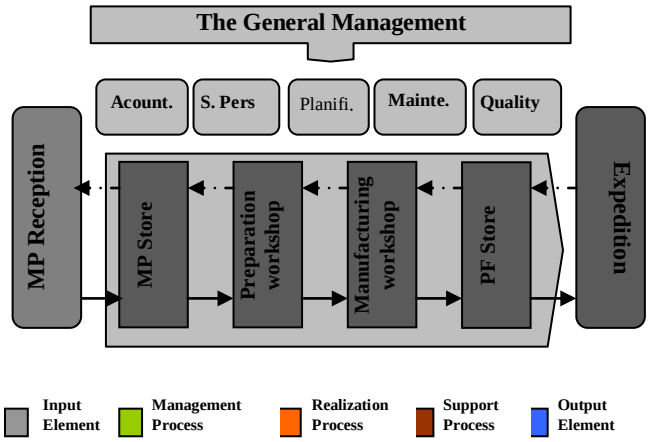

Fig.6. Presentations of the Process of Production of Enterprise X

4.2. BSC Implementation of the clothing dashboard process:

As part of our study, we use the method ECOGRAI/BSC to control the production process. We favor a transversal approach that defines the right strategy and deploys it in the context of the preparation to identify levers for action that will, via feedback, achieve the strategic objectives set by the company.

4.2.1. Analysis of the existing data:

Identification of the overall objectives of the company X:

The mission of the company X as a subcontractor specializing in the manufacture of underwear for children and adolescents is to meet the needs required by its unique contractor located in France, while respecting the standards predefined by the latter in garment according to the terms of reference set by both parties.

To achieve this mission in a turbulent environment and a highly competitive sector known for extreme volatility in either the volume of demand, or the variety of customer requirements in terms of cost, time and quality, induces a need for flexibility of production facilities at various levels. For this purpose, the company has set a number of strategic objectives, including customer loyalty (satisfaction of needs and accurate in terms of quantity and quality deadlines); and ultimately improves returns (through cost control production) These strategic objectives guide the company X in its future actions. They are part of the formulation of corporate strategy, hence the need to translate them into action programs.

Identification of critical activities and performance factors:

After defining the overall objectives of the company X, we are going to break them up into sub objectives of the tactical level. The concerned process is that of production represented in the cartography in Fig.7.and8.

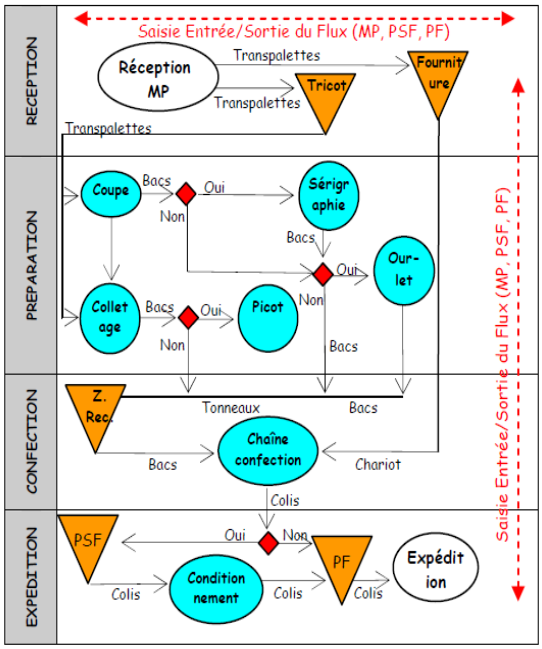

Fig. 7. Production Process within company X

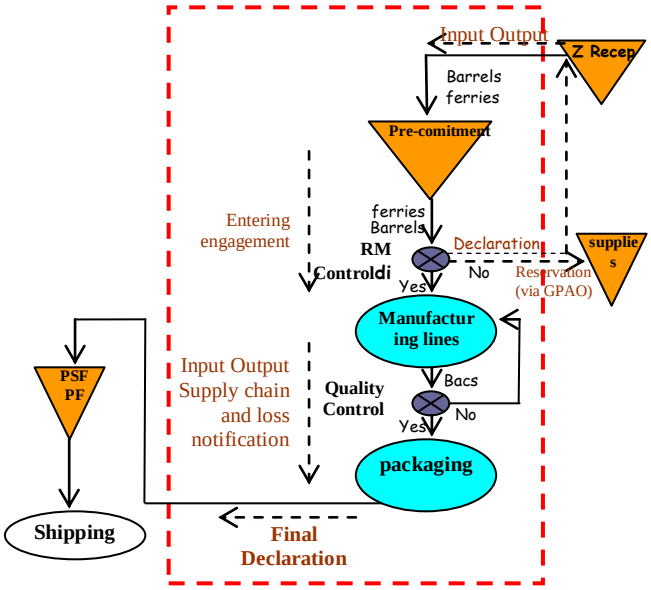

Fig. 8. Manufacturing Process within company X

As part of the subcontracting agreement, the company X enjoys the benefits of more efficient production. When a company focuses on the manufacture of specific products or processes, it becomes more efficient and acquires expertise. These skills frequently increase through technology and knowledge of employers that are transferred to the subcontractor by the mechanisms of outsourcing.

But in recent years, the textile industry has experienced a true crisis due to global competition and the continued rise in commodity prices. It is in this context that the company X has fixed a set of goals at the level of its production process in order to achieve a performance level enabling it to maintain its position close to the unique and principal contractor as well as to improve its returns.

The objectives are to improve quality, reduce production costs and ultimately optimize the delivery time (Fig. 9).

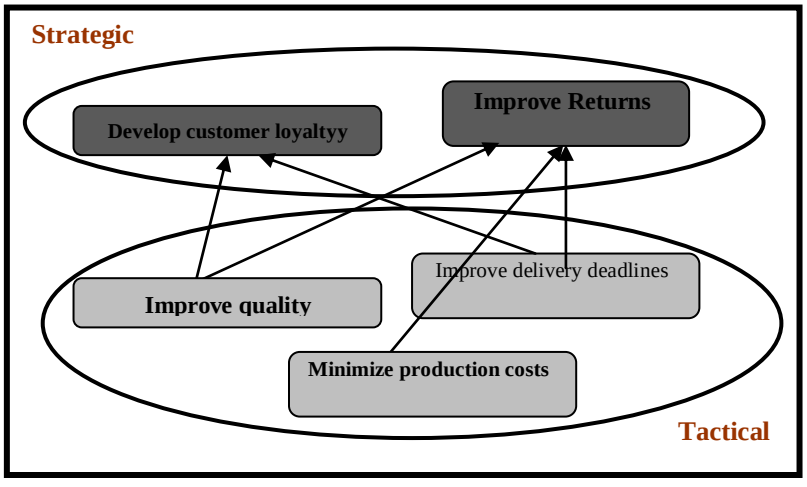

Fig. 9. Breakup of strategic objectives into tactical ones

4.2.2. Choice of variable action

For the determination of sub-objectives (performance factors) of the process of manufacture which is the focus of our study, we perform a diagnosis of the clothing function according to the SWOT logicand that permits the identification of the strengths and weknesses of processto be studied, as well as the threats and opportunities comingfrom other processes of the entreprise.

To do so, we will initially construct the GRAI grid (Table 2) as a reference for models providing an overview of all processes that have a direct impact on the process of manufacture.

Table. 1. GRAI grid of the manufacturing process

Function / H/P	External Information	Logistic	Quality	MANUFACTURING	Maintenance	Supplies store	Internal Information
H = 1year P = 1month	Contract (Sub-contract)	assesment of respectingdelivery deadline	Quality assessment				
H= 1month P = 1sem	Client'sOrder + MPReception	OF planning + Calculationofforecastexpenses		Decision Center Follow up of planning + declaration of turnovers to the operators		Calculation of MPavailability	
H = 1Sem P = 1day		Status of Product	Products control at every level of physical flows	Launching the production (at the level of manufacturing lines	Daily follow up offailures	Reply to supplies reservations	Need forMP per OF

Decision framework
Information link

Based on this analysis and in coordination with the heads of section, we identified a set of levers also called operational objectives and they are as follows (Fig. 10.):

A. Optimizing the execution time of manufacturing operations
B. Optimizing the processing costs
C. Optimal use of the supplies
D. Minimizing the number of defective parts
E. Improving the versatility of operators
F. Minimizing errors of quality
G. Reducing the changeover time series
H. Improving performance by operator
I. Improving the skills of operators
J. Involving operators in the process of continuous improvement
K. Maximizing the accuracy of the OF at sale price (quantity)

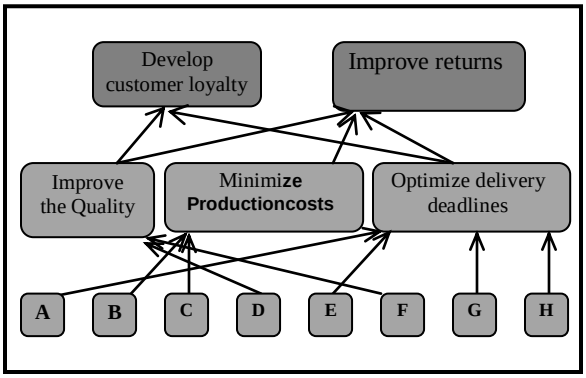

Fig. 10. Decomposition of objectives from the strategic level to the operational level

4.2.3. Implementation of the BSC:

Considering the chosen BSC implementation approach, and according to the performed diagnosis that led to the determination of objectives or levers that have to be considered in evaluating the performance of the manufacturing process, we are going to classify these objectives according to the logic of the BSC by assigning to each axis their associated objective or objectives (table 2).

Then attribute to each objective a performance indicator that would help assess its degree of achievement.
Therefore, it would be convenient according to the BSC logic to structure the objectives in a way that each perspective is based on another perspective (Fig.11.).

Table. 2.Affectation of the objectives to the BSC axis

Client	- Minimize the number of defectives parts - Optimize the time of execution of the manufacturing operation - Maximize the accuracy of the OF at sale price (quantity and quality)
Financial	- Optimization of processing costs
Internal Process	- Optimal use of supplies. - Reduce execution time (SMED) - Improvement of output per groups - Minimize quality errors. - Improver activity
Learning	- Improve the competences of operators. - Improve the versatility of operators - Include the operators in the process of continuous improvement

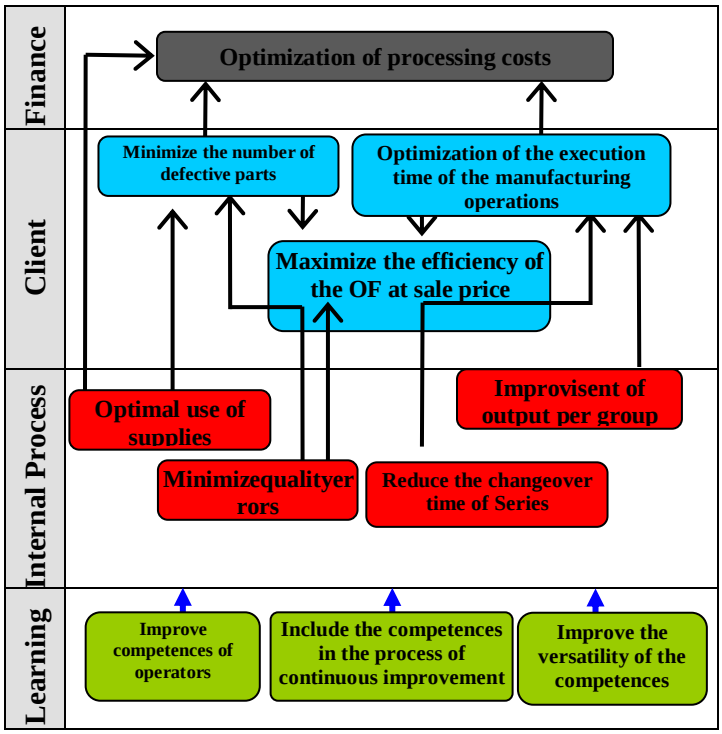

Fig.11. *Strategic map of the manufacturing process*

4.2.4. Structure and construction of the BSC

In this last stage, the aim is to structure the BSC and to build it using the Excel spread sheet as a tool, because it is well mastered by the heads of sections and heads of groups, and because it does not generate additional costs.

Structuring

The structure of BSC is configured as follows:
- Each index combines a strategic goal (the goal);
- Strategic initiatives to be undertaken in the four areas to achieve these objectives.

Construction

The dashboard was built in the form of four Excel workbooks; each one corresponds to a BSC axis with the representations of the indicators that are associated with it.
Each workbook consists of two pages, one sheet for the visualization of signal indicators. The second piece, called analysis sheet, usually has all the information that can inform decision-makers about the displayed information.
Each analysis sheet includes several other sheets; each sheet corresponds to one week and thus represents all the information that will be needed for the calculation of performance indicators in the same week.

5. Conclusion

The implementation of the BSC to drive logistic performance can meet two challenges: to improve and control the performance of the company on the one hand, and to supply chains on the other hand. The contribution of this paper is to present a conceptual basis of the implementation of the BSC method combined with the ECOGRAI one, then present a methodology for implementation in the industrial context, and finally, to test this methodology in a clothing company.

However, this article is far from being perfect. Therefore, it is useful to consider a further study to analyse the impact of the introduction of BSC on the logistics performance of the Company X, to monitor results and steering of manufacturing activities in order to assess the contribution of this tool and the methodology adopted for its implementation.

Taking into consideration the lack of consensus around a common tool for measuring logistic performance, BSC that is supported by an approach of implementation according to the ECOGRAI logic seems to be tools that can gain ground among the ones that already exist.

In our future researches, we will try to study the impact of this methodology and the contribution of these tools (ECOGRAI/BSC) in improving logistic performance of the company, also of the closest links to the supply Chain and the supply Chain as a whole.

6. References

Bititci, U.S., Mendibil, K., Martinez, V., and Albores, P. (2005). Measuring and managing performance in extended enterprises'. *International Journal of Operations and Production Management*, Vol. 25, n°4, p 333-353.

Bitton, M. (1990). ECOGRAI : méthode de conception et d'implantation des systèmes de mesure des performances pour organisations industrielles. *Thèse de Doctorat en Automatique*, Université de Bordeaux I.

Brewer, P.C. and Speh, T. (2000). Using the balanced scorecard to measure supply chain performance, *Journal of Business logistics*,Vol. 21, n°1, pp. 75-93.

Cerutti, O. and Gattino, B. (1992).*Indicateurs et tableaux de bord*', AFNOR gestion.

Chen, M. C., Yang, T., Li., H.-C. (2007). Evaluating the supply chain performance of IT-based inter-entreprise collaboration. *Information & Management* 44, 524-534.

Chow, W., Madu, C., kuei C., Lu, M., Lin, C., Tseng, H. (2008). Supply chain management in the U.S. and Taiwan: an empirical study. *Omega*, Vol. 36, n° 4, 665-679.

D'amours, S., Montreuil, B., Lefrançois, P., Soumis, F. (1999). Networked Manufacturing: The impact of information sharing. *International Journal of Production Economics*, (58)63-79,1999.

Ducq Y., Vallespir B. (2005). Definition and aggregation of a Performance Measurement System in three aeronautical workshops using the ECOGRAI Method.*International Journal of Production Planning and Control*, vol. 16, n° 2, March 2005, pp 163-177.

Fernandez, A. (2000). *Les nouveaux tableaux de bord des décideurs, Editions d'Organisation*, Paris, 2ème éd.

Germain, C. (2004). La contingence des systèmes de mesure de la performance: les résultats d'une recherche empirique dans le secteur des PME. *Finance-Contrôle-Stratégie*, vol. 7, n°1, pp. 33-52.

Ghalayini, A.M. and Noble, J.S. (1996). The changing basis of performance measurement, *International Journal of Operations & Operations Management*, Vol. 16, n°8, pp.63-80.

Hieber, R. (2002). Supply Chain Management- Acollaborative Performance Measurement Approach, Hochsculverlag AG, Zurch.

Kaplan, R.S., and Norton, D.P. (1996). The Balanced Scorecard: Translating Strategy into Action', *Harvard Business School Press*. In Cauvin and Bescs.

Koh, L.S.C., Demirbag, M., Bayraktar, E., Tatoglu, E., Zaim, S. (2007). The impact of supply chain management practices on performance of SME's. *Industrial Management & Data System*, Vol. 107, N°1, pp. 103-124.

Li, G., Yang, H., Sun, L., Sohal, A. S. (2009), The impact of IT implementation on supply chain integration and performance. *International Journal of Production Economics* 120 (1), 125-138.

Morana, J. (2002), Le couplage supplychain management-Tableau de bord stratégique : une approche exploratoire, *thèse de doctorat*, université de la méditerranée Aix-Marseille II.

Paulraj, A., Lado, A.A. and Chen, I.J., (2008) 'Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer-supplier relationships'. *Journal of Operations Management*, 26(1):45-64.