Design of an evaluation system and performance management of supply service: case study

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Abstract—The purchasing department is one of actors of supply chain who must be controlled because of its heavy weight on the performance of all business functions. This control requires a good implementation of measurement tools.
In this context, we consider to measure the performance of service provision by indicators that inform policy with such a function in the supply chain. The methodology is to propose indicators based on the concept of Balanced Scorecard edges. Next, based on a questionnaire to collect the most useful indicators for the proper management of service provision within Moroccan companies.

Keywords: Supply service, performance indicators, BSC.

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1. Introduction

Nowaday, with the globalization of markets and a much stronger competition, organizations need to explore all opportunities for improvement that may occur to them. However, before thinking to improve, it is necessary to measure and determine the current situation in which the organization is located. For this, it is necessary to implement good measurement tools.

The purchasing department is the most function upstream in the supply chain needs to be improved. Indeed, for a medium-sized company, products and services purchased represent 40 to 60% of total spending, and the materials and components are sourced from 60% to 70% of cost of goods manufactured in the majority of business [27].

It was therefore necessary to learn how to measure the performance of services supply and therefore create key performance indicators specific to each function whose scope is not limited to the aspects of cost or price, but embraces the entire field of function activity in its modern sense [2].

The work was carried out in four steps:

Step 1: Sticking out existing gaps in the supply function by analyzing upstream supplier and stock side downstream side.

Step 2: Perform a literature survey to gather performance indicators along the axes of the Balanced Scorecard.

Step 3: Conduct a questionnaire to filter the most useful indicators for effective management of service provision within the Moroccan businesses.

Step 4: Validate our approach by a case study of a Moroccan SMEs.

2. Procurement Process

2.1 The strategic role of supply:

The supply function is the most upstream of the supply chain. Its mission can be defined as follows: "This is to make available the right product in the right place at the right time, the global optimum cost, providing the level of information expected. The goal is to satisfy all stakeholders of the global supply chain, the purchasing department is the one link in the chain [21].

According to, the supply function includes all transactions in which are made available to the company all the products and services they need and must obtain outside [25]. Sequence of key supply operations is as follows (Fig 1):
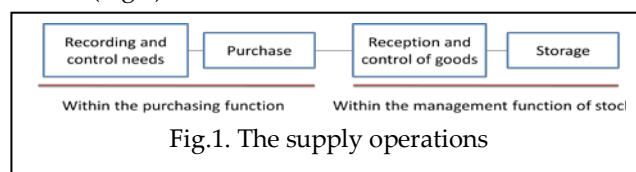

Fig.1. The supply operations

From these sequences the procurement function performs two main tasks:

(1) An acquisition mission by conducting and maintaining relationships with suppliers to provide the company with goods and services they need. This mission includes the choice of purchasing policy, the study of upstream supplier selection and monitoring of suppliers market.

(2) A logistics mission in organizing the flow and storage of purchased products at the lowest cost and with maximum guaranteed by making predictions , expression of needs, control and reception.

The supply function can achieve its goals of cost, quality and time if it has a thorough understanding of the strengths and weaknesses of the environment and the

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characteristics of suppliers from which it can supply. According to [17].The delivery providers and reliability of the distribution influence over the production time, the inventory level and service quality of each manufacturer. The purchasing department should also make an inventory of the material means and the goods available in the warehouses of the company and anticipate the needs of other services.

2.2 Link supplier - purchase

The purchase is the result of several operational tasks performed in chronological order. The purchasing process can be divided into six main phases: defining the need, research suppliers, launching tender, bid analysis, negotiation and contracting.

The stage of the selection of suppliers is the phase procurement process, which has a crucial impact on the overall performance of any business. It is commonly accepted that 76% of the turnover of large multinational industry and 65% of those service providers are used to adjust [2].

The problem with this choice can be studied under two aspects: determining the number of suppliers, the type of relationship with them and select the best suppliers [1].

The first writings in this field are those of Dickson[10] has shown that the choice of suppliers is a multi decision often involves the simultaneous consideration of several criteria such as price, delivery time and quality , and that it is extremely difficult to find a supplier that excels everywhere [1].

In a review of subsequent literature Weber [32] showed that the criteria set out by Dickson [10] are studied most items, although the relative importance of each criterion has changed following the change in the industrial context and the concept of Just In Time (Table 1).

TABLE.1
Criteria for selection of suppliers and their weight by Dickson [10] and Weber [32]

Criteria	Rank according Dickson	Rank according Weber
Price	6	1
Delivery	2	2
Quality	1	3
Production capacity	5	4
Geographic location	20	5
Technical capacity	7	6
Management and organization	13	7
Reputation and position in the industry	11	8
Financial situation	8	9
Past performance	3	9
Repair services	15	9
Attitude	16	10
Authorized packaging	18	11
Process control	14	11
Training and support	22	12
Compliance processes	9	12
Social relations	19	12
Communication system	10	12
The reciprocal relationship	23	12
Impression	17	12
Desire to do business	12	13
Volume of purchases in the past	21	13
Guarantee Policy	4	14

Vonderembse [31] indicate in their study that the selection process is multi providers and that the most important criteria in this order: quality , product performance, reliability of delivery , product availability,

cost, time, technical capacity of supplier, after sales , financial position and the last position the geographical location of the supplier service.

Research and Pullma Verma [30] shows that the supplier evaluation is mainly based on four criteria: quality , price, delivery and flexibility. And the empirical study Katsikeas [20] shows that the evaluation of supplier performance is essentially based on four criteria: delivery reliability, price competitiveness, service and technological capacity.

In conclusion, the different works in the field of sourcing show that tryptic QCD (quality, cost, time) remains the most used in this process. These and other criteria are sometimes conflicting, which makes the selection process complicated suppliers [1].

2.3 Link supply - stock:

Awareness of the importance of supply was accompanied by a consideration of stocks. It is actually controlling the volume inventories of raw materials or semi -finished products in order to minimize costs and fixed capital. This is one of the key areas of logistics upstream (as opposed to the downstream logistics of distribution).

The company is generally subject to two constraints. Reduce the rate of supply, the higher the average stock is low and the cost of holding inventories are minimized (but ordering costs increase). By cons, plus the rate of supply is , the more it will generate significant storage costs. Faced with this double bind, the central problem of economic inventory management is to determine:

The optimal number of orders that will minimize the total cost of inventory (total cost of storage and the cost of ordering).

Dates replenishment into account the time and the vagaries of supply.

The quantity of products that the company must order.

For a procurement decision must jointly determine an order date and order quantity. Conventional management policies stocks converse following two categories that highlights the period or amount. This gives the one hand, policy management stocks fixed period and amount of policies and variable supply fixed amount and variable period of replenishment.

3. Performance measurement and supply indicators

3.1 Performance Measurement:

The measurement of performance is not a new concern, since, as stated O'Brien [26], it was already present at the time of the pyramids, when the architects of the time controlled for example the progress of work, the raw materials used, production targets to meet, etc. [26]. The advent of the industrial age has only amplified the need to measure performance, particularly to assess the levels of mass production, but it is certainly in the 1980s, with the beginning of the era of information and new technologies, the performance measurement has been booming in business [26]. The statistical process control, flow analysis , decision trees, Gantt or PERT , etc.., are just some of the tools that are now part of

everyday conscious companies monitor their performance [30]. The performance measurement is now part of all business activities: production, maintenance, sales and purchasing, customer relations, quality, environment, human resources, etc. [26]. The field supply is obviously not immune to this practice.

This cannot do that using indicators that their characteristics are reflected in the following definitions:

1. A performance indicator is a quantitative data that expresses the effectiveness and / or efficiency of all or part of a (real or simulated) system , compared to a standard, determined and accepted plan as part of a business [3] strategy.

2. A performance indicator is a numerical translation of the strategic objectives of the organization [12].

3. A performance indicator is information to help an individual actor or organization to drive the course of action towards achieving a goal, or to enable it to assess the result. [6]

4. A performance indicator is associated with a" control action" which must be operational relevance [23].

The indicator is seen as "an objectified measure"[5], a decision to either control the process for achieving objectives (control logic) or change the objectives themselves (logical progress).

The objectives of any organization can be broken down to any level of business decision. They are characterized by their nature and time horizon. It is the same for performance indicators. So we can make a difference between strategic, tactical and operational indicators [6], (Fig 2).
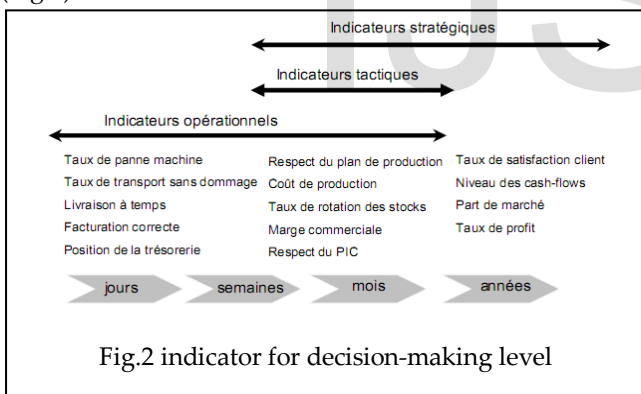

Fig.2 indicator for decision-making level

3.2 The indicator relationship and supply function

The performance of the procurement function is apprehended through the satisfaction of a set of objectives inherent in the chosen strategy. These objectives are based on several horizons and this is called strategic, tactical and operational objectives. This involves the variation of the performance on these same three decision-making levels [4] and to assess the degree of achievement of each objective, a company then uses to measure its basic performance. For this, it relies on a set of performance indicators or indicator system [16].

Moreover, the organizations that evaluate their performance through the implementation / enactment , type indicators qualitative and quantitative financial and non-financial [9] [7] whose role is to provide diagnostic practices throughout the firm [22] [23] [13], while relatively small number for a quick overview of the status of the organization , in order to make it more efficient.

The common representation of decision tool which includes such indicators is the "dashboard". This management tool capable of improving change [9], has several assessment areas: financial, customer, internal processes, organizational learning [19]. , Suppliers, politics, environment [11] [8] [13] [18] [28] [14]. In sum , as Germain [15] notes , the current dashboard is formed by the addition of five common features : (1) the combination of financial and physical indicators to assess the performance in its entirety, (2) the presence of management indicators focus on the ongoing actions and performance indicators , (3) the selection of a limited number of indicators , (4) the desire to translate the strategy to operational level and link indicators to the strategic objectives of the company and (5) focus on anticipating and finding a posteriori .

As a result, a dashboard supply should focus on both financial and non financial indicators but also indicators related to the overall business strategy.

4. Indicators of service supply according BSC:

4.1 Balanced Scorecard (BSC):

Some traditional approaches to measuring performance ignore a dimension considered by capital [19], ie taking into account the interactions between strategic goals and operational performance, coupled with the deployment of these objectives and performance at all levels the organization. Realizing and no action can alone provide relevant performance, these players offer the concept of "Balanced Scorecard" or "scorecards" from a rigorous expression of strategic objectives framework and methodology for the decline in operational terms.

Performance indicators are divided into four areas (Fig 3):

The axis "financial performance" includes indicators such as commodity prices or costs of supplies, wages, transport costs, the added value of productivity, the rate of capital turnover. In fact, the only financial indicators are relatively easy to measure, but does not provide a fairly complete picture of the smooth operations of the supply chain.

The axis "internal process" includes indicators such as sales forecasting, production quality, production flexibility, the internal time cycles. These indicators measure the operating performance and are not necessarily related to financial results.

The "clients" axis contains flags that determine customer oriented as delivery time, the execution cycle of the order, the customer satisfaction rate and the execution of the command line performance.

The axis "organizational learning" is the most difficult to define dimension, indicators quantify the effectiveness of the company in the integration of new skills.
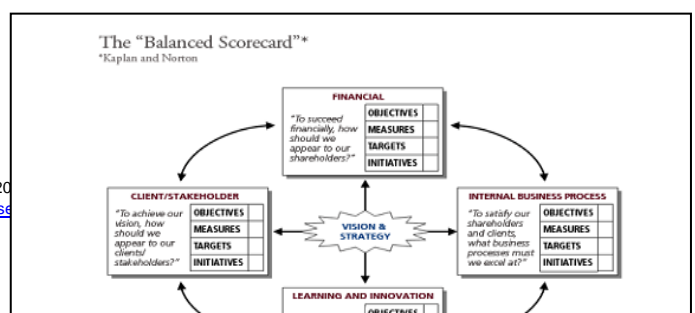
Based on the work of [24] [29] and the reference to the KPI's, we propose a classification of indicators, according to the principles of the Balanced Scorecard of Kaplan [19].

TABLE.2

Indicators of the procurement function

FINANCIAL AXE
- Lower purchase price over historical price
- Evolution purchase price / market price
- AC purchase
- Cost of service / CA bid managed by the service
- Cost of service / savings generated by the service.
- The average value of an order
- Average cost of placing an order
- Amount Buying Life Cycle Cost
- Standard forecast / order value
- Changes in inventories
- Evolution consumer materials
- Increased Delays payment provider
- Evolution of Total Cost of Ownership (TCO)
- Financial Investment in stock
Value-annual purchase by supplier

CLIENT AXE
- Satisfaction rate
- Number of days late cumulative / number of late deliveries
- Actions affecting market share
- Actions affecting customer loyalty

INTERNAL PROCESSES AXE
- Individual performance / objectives
- Nb . purchase requests processed (+ / staff)
- Average Processing Time of Purchase Requisition
- Goodwill amounts received / quantities ordered
- Nb . of non-conforming lots / nb . lots received
- Nb . lots received on time / no . batch received - % of buyers use the Internet at least 1 time / week
- Participation in exhibitions
- Rate of automation controls
Average Time required to set up a command

- Orders to suppliers ÷ Total number of orders
- Nb . EDI vendors / nb . total suppliers
- Nb . active suppliers followed
- Nb . framework contract managed
- Nb . products managed under contract managers / nb . products managed
- Application rate contract management
- Nb . suppliers in terms of progress
- Rate of active suppliers
- Rate of suppliers imposed
- Nb . providers with contract management
- Nb . suppliers involved in upstream
- Nb . of approved suppliers
- Nb . providers under Quality Assurance
- Nb . ongoing consultations (/ geographical area)
- Nb. Benchmark committed
- Approach to Globalization
- Nb. Application urgent Purchasing / nb DA
- Nb. litigation
- Inventory turnover by product type
- Rate of rejection due to quality defects
- Number of situation out of stock causing interruptions in production
- Number of control change classified by cause
- Orders received and being
-Productivity and workload of employees
- Participation rate approaches Make or Buy
-% Of Cahiers Load established with the purchasing department
- Nb. CDC functional / nb. Technical CDC
- Rate of study or work completed on time
- Reduced number of suppliers
- Nb. input and output panel
- Geographic location of strategic suppliers
- Response rate suppliers

AXE ORGANIZATIONAL LEARNING
-% Of shoppers training seminar
- Nb. subscriptions to technical journals / data bases
- Existence tool knowledge capitalization
- Prime progress
- Turnover
- AC purchase covered by the service / sales total purchase
- Absenteeism
- Number of hours of training
- AC purchase / actual

4.2 Selection of indicators:

To establish the most important indicators for Moroccan companies performance, we conducted a questionnaire to collect the data necessary for the diagnosis.

So that the diagnosis is complete and effective, it was necessary first target actors to be performed on the questionnaire. Our survey was designed to department heads supply of Moroccan enterprises of industries and different sizes such as: food processing, automotive, textile, cement, paper, etc. Among the thirty - one companies responded to our questionnaire.

The choice of these companies is based on the following criteria:

- The company has a procurement department at least ISO 9001 certified;

- The procurement department must be concerned with the use of performance indicators.

Based on (Table 2), we associated with each indicator, the answer sheet that contains three columns corresponding to the following assessments: "important", "important " and " not important." Inspired by the questionnaire LAVINA, each response is assigned a weighting respectively: 1 - 0.5 to 0. The selection of indicators in each axis is to compute the sum of points in the three columns.

4.3 The analysis and evaluation of results

We calculated the sum of points for each indicator according to the weights, and the percentage of importance, and we chose indicators that reaches or exceeds 50% significance (Table 3).

TABLE 3

Results and scores for each axis

	Important	Somewhat important	Is not important	Sum	% Importance
FINANCIAL AXE					
1	- Lower purchase price over historical price	22	5	3	24,5	82%
2	- Cost of service / CA bid managed by the service	20	2	8	21	70%
3	- Service cost / savings generated by the service.	26	4	0	28	93%
4	- Changes in inventories	29	1	0	29,5	98%
5	- Delays increase payment provider	18	2	10	19	63%
6	- Evolution of Total Cost of Ownership	13	5	12	15,5	52%
7	Value-annual purchase by	27	3	0	28,5	95%

	supplier				
CLIENT AXE					
8	- Satisfaction rate	27	3	0	28.5	95%
9	- Number of days late cumulative / number of late deliveries	28	2	0	29	97%
10	- Actions affecting market share	20	5	5	22.5	75%
11	- Actions affecting customer loyalty	23	4	3	25	83%
AXE INTERNAL PROCESSES					
12	- Average Processing Time of Purchase Requisition	28	2	0	29	97%
13	- Nb. of non-conforming lots / nb. lots received	22	5	3	24.5	82%
14	- Orders to suppliers ÷ Total number of orders	19	8	3	23	77%
15	- Nb. active suppliers followed	28	1	1	28,5	95%
16	- Inventory turnover by product type	28	2	0	29	97%
17	- Rate of rejection due to quality defects	25	3	2	26,5	88%
18	- Orders received and being	15	8	7	19	63%
19	- Reduced number of suppliers	14	4	12	16	53%
AXE ORGANIZATIONAL LEARNING					
20	- IT purchase covered by the service / IT total purchase	19	9	2	23,5	78%
21	- Absenteeism	14	5	11	16,5	55%
22	- Number of hours of training	28	1	1	28,5	95%
23	- IT purchase / actual	17	5	8	19,5	65%
24	- Prime progress	22	5	3	24,5	82%

From this table we have reduced the number of indicators (Table 2) 70 to 24 (Table 3), whose aim is to

facilitate the selection manager to establish good performance indicators

4.4 Application:

To implement our work, we chose a Moroccan midsize company that operates in the food industry wishing to measure the performance of its supply service.

For this service, the MIS (management of computer-aided manufacturing) Access provides no indicators other than inventories of raw materials and consumables. CMMS (Maintenance Management Computer Aided) business allows tracking of orders since the creation of purchase requisitions to billing, consulting historical movements of an article, but without providing indicators performance. Available data in the CMMS are very rich and diverse and can be a source of performance indicators.

4.2.1 Objectives:

The objectives of the company are numerous and declining in three dimensions managerial, operational, tactical and strategic, a significant number of indicators is required. This is called system of indicators is a "set of indicators, necessary and sufficient for the actions envisaged defined in accordance with the set of all the objectives of the system under consideration"[4].

To combine these goals, we conducted an interview with the supply company official. From this interview, we collected the following information:

(1) The company plans to reduce its selling prices to increase market share while maintaining its margin level and improving its profitability.

(2) The business strategy is based on cost leadership: the customer expectations are especially geared to the price, time and quality.

We classified the objectives according to the 4 axes of the Balanced Scorecard (Table 4):

TABLE.4

Objectives and hierarchies according to the 4 axes

AXES	Hierarchy
Financial: - Lower sales prices in order to increase its market share	- Reduce the cost of purchasing and storage costs. - Check the cost of service provision
Client: - Increase customer satisfaction	- Ensure timely delivery
INTERNAL PROCESSES: - The decline in stock	- Improve inventory turnover

- Maintain a database of available suppliers, dynamic, efficient and effective; - Focus on quality of supply	- Improving the quality of final products. - Decrease the execution cycle of the order, - The compliance of execution of the order.
Organizational learning: - Improve skills and abilities - Involve staff in the company's results.	

4.2.2 Definition of indicators:

The identification of the most relevant indicators comes to check the success of a goal. As for the choice of strategic objectives which must choose a limited number, there is a limited number of indicators for each objective. According to the results of the questionnaire (Table 3) and collective work with the director and the responsible, we select only the relevant indicators in each axis in relation to established objectives.

TABLE.5

Proposed indicators for the service provisioning of a Moroccan SMEs

Axe	Strategic Objectives	Indicators
Financial	- Reduction of purchase and the cost of storage costs	- Reduction of purchase price over historical price - Changes in inventories - Increased time payment to the supplier - Value of annual purchases by supplier
	- Check the cost of service provision	- Cost of service / CA bid managed by the service - Cost of service / savings generated by the service
Client	- Increase customer satisfaction	-Rate customer satisfaction
	- Ensure timely delivery	- Number of days late cumulative / number of late deliveries
	- Maintain a database of	- Nb. active suppliers followed

internal processes	available suppliers, dynamic, efficient and effective	
	- Decrease the execution cycle of the order,	- Average Processing Time of Purchase Requisition
	- The decline in stock	-Inventory turnover by product type
	- Improve the quality	- Rate of rejection due to quality defects
organizational learning	- Improving Skills and abilities	-Number of hours of training
	- Involvement in results	- Prime progress

5. Conclusion

The establishment of performance indicators will not change much for the performance of the organization. It is only by combining good performance indicators with an effective action plan that the organization can remain competitive.

Our work is a contribution to the setting-up of performance indicators by the method of Balanced Scorecard to improve the results of procurement service

To achieve this, we advocated a methodology based on four steps: collecting information using a questionnaire, analysis and evaluation of results, the determination of objectives and the development of indicators designing an evaluation for controlling service supply system.

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