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**Chavez, Antonio *Creation of a Supplier Scorecard*****Abstract**

Company XYZ is a European company founded in the mid 1970's. From its creation Company XYZ has grown from a small company to a global, and diverse organization with presence in more than 30 countries across the world. A recently acquired business unit located in the Midwest identified the need to develop a supplier performance management tool to align operations with strategic partners to support growth strategies and competitiveness in the market. Company XYZ initial approach was to design a tool that could be used to evaluate suppliers who provide raw and direct materials for the operation. An internal and external analysis was performed to identify metrics most commonly used by best in class organization across industries, find a commonality that could be used for the definition of the metrics utilized on the design of a supplier performance management tool for Company XYZ.

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## Table of Contents

Abstract .....	2
List of Figures .....	6
Chapter I: Introduction.....	7
Statement of the Problem.....	8
Purpose of the Study .....	9
Assumptions of the Study .....	9
Definition of Terms.....	9
Limitations of the Study.....	11
Methodology .....	11
Chapter II: Literature Review .....	12
The Balanced Scorecard .....	12
The Balanced Scorecard as a Strategic Management System .....	14
Supply Chain.....	16
Key Performance Indicators (KPI) .....	19
Chapter III: Methodology .....	21
Supplier Performance Management Tool Objectives Definition.....	21
Data Gathering .....	22
Key Metrics Definition .....	23
Data Validation .....	24
Evaluation of Electronic Systems Required for the Implementation of the Supplier Management Tool .....	24
Summary .....	25

Chapter IV: Analysis and Design of the Supplier Performance Management Tool.....	26
Supplier Performance Management Tool Objectives Definition.....	26
Data Gathering.....	27
Gathering of External Information.....	27
Gathering of Internal Information.....	29
Key Metrics Definition .....	29
Indicators.....	30
Sub-indicators .....	30
Analysis of the Measurements .....	33
Validation.....	34
Evaluation of Electronic Systems Required for the Implementation of the Supplier Performance Management Tool.....	34
Chapter V: Discussion, Conclusion and Recommendation .....	36
Discussion.....	36
Conclusions.....	37
Recommendations.....	38
References.....	39

## **List of Figures**

Figure 1: Needs and decisions Company XYZ Requires the Supplier Performance Management

Tool Supports.....27

Figure 2: Attributes of the Indicators and Sub-indicators of the Supplier Performance

Management Tool .....31

Figure 3: Indicators and Sub Indicators of the Supplier Performance Management Tool .....32

Figure 4: Supplier Performance Definition.....33

## **Chapter I: Introduction**

Company XYZ is a European company founded in the mid-1970's. From its creation Company XYZ has grown from a small company with less than \$200,000 in capital investments to a multibillion, global, and diverse organization with presence in more than 30 countries across the world. Company XYZ's growth strategy is based on acquiring smaller firms and manufacturing facilities, usually competitors from within the markets Company XYZ serves. To manage and control the expanded operations Company XYZ has established Regional Headquarters across 140+ countries in which they have a presence. The Regional Headquarters are the centers hosting departments responsible of the business operations as well as Engineering and Research and Development (R&D) functions focused on the development of new products. These centers play a significant role to advice the organization about the different local laws, and regulations specific to the countries where Company XYZ has operations.

The Regional Headquarters also have the responsibility to oversee the proper implementation of policies; directives and guidelines to ensure regional operations adhere to Company XYZ's global requirements and policies. This responsibility is key to support the growth strategy devised by Company XYZ, as they serve as subject matter experts to support the integration of newly acquired facilities to a global organization via an onboarding process facilitates the adoption of a new business culture.

The onboarding process includes a well-defined approach to transition employees and communicate the corporate culture of Company XYZ. The process also includes a pathway to ensure payroll and benefits transition over promptly and smoothly when a new company is acquired. However, many of the newly acquired facilities are usually small firms, family or individually owned, that lack the operational discipline, processes, and procedures commonly

required by a global firm. Furthermore, the onboarding process does not provide a clear path or standardized procedure for the operational areas to use as an aide during the identification, development, and implementation of metrics and performance indicators required by Company XYZ; delegating the responsibility to the local management at the plant level.

An area that usually suffers during the onboarding process is the procurement department. The reason being that the procurement departments have built relationships with the suppliers based on “handshakes” or verbal agreements only, and these relationships lack the proper mechanisms to validate the performance of suppliers, and the practice may cause operational inefficiencies, and hide high costs.

In the United States Company XYZ has 45 locations with a plan to achieve 50 locations by the end of 2019. One of the 45 locations, which became part of Company XYZ less than 12 months ago, is the area of study of this paper. The new acquisition lacks the processes and mechanisms to track vendors performance. This situation enables the plant and divisional supply chain leader to look for alternatives that will provide the ability to measure performance and utilize the metrics to improve efficiencies and strengthen their position within their supplier’s base.

### **Statement of the Problem**

The procurement function of Company XYZ is dedicated to the strategic sourcing of goods and services, focused on cost savings through a consolidated approach to vendor management via corporate contracts. Company XYZ relies on local supply chain teams to manage daily vendor relations and performance. The problem is that Company XYZ lack formal mechanisms to track, report, and monitor supplier’s performance. The lack of proper supplier



performance indicators may result in partnering with inadequate sources, unable to meet the company requirements, and representing an unnecessary risk for business continuation.

### **Purpose of the Study**

The purpose of this study was to define a supplier performance tool and to establish the criteria, metrics, and responsibilities for its proper implementation. During the definition work the local supply chain management team identified the metrics and procedure to use utilize the results to provide feedback to suppliers and corporate buyers. The initial roll out of the supplier performance tool was limited to measure direct and raw material suppliers who make up to 80% of the annualized site's spent.

### **Assumptions of the Study**

The study assumed that Company XYZ did not have a standardize corporate vendor's performance tool that could cascade to a specific site. Another assumption was the lack of corporate requirements outlining vendor's performance, and the lack of corporate requirements that could dictate specific metrics or KPIs to be measured. It was also assumed the created scorecard would be accepted by corporate Supply Chain leaders, and a roll out plan for implementation would be develop upon acceptance.

### **Definition of Terms**

The following terms were used in this study and the definitions will help understanding the concepts.

**Balanced scorecard (BSC).** Strategic planning and management system that organizations use to: communicate what they are trying to accomplish; align the day to day work with strategy; prioritize projects, products, and services, measure and monitor progress towards strategic targets. (Balanced Scorecard Institute, 1998)

**Enterprise Resource Planning (ERP).** A framework for organizing, defining, and standardizing the business processes necessary to effectively plan and control an organization so the organization can use its internal knowledge to seek external advantage. (American Production and Inventory Control Society (APICS), 2010)

**Key Performance Indicator.** A quantifiable measurement that reflects the critical success factors of an organization and can vary between businesses and industries. (American Production and Inventory Control Society (APICS), 2010)

**Lead time.** A span of time required to perform a process or series of operation. In a logistics context, the time between recognition of the need for an order and the receipts of goods (American Production and Inventory Control Society (APICS), 2010)

**Lot number.** A unique identification assigned to a homogeneous quantity of material (American Production and Inventory Control Society (APICS), 2010)

**Onboarding.** The action or process of integrating new employees into an organization or familiarizing a new customer or client with one's products or services. (Dictionary.com, 2019; ABPMP, 2018)

**Research and Development (R&D).** Systematic activity combining applied research and focused on the discovery of solutions to problems, development of knowledge or the creation of new goods. (Online Business Dictionary, 2019)

**Strategic management and measurement.** Strategic management and measurement practice fueled by the generation of meaningful metrics in an organization with the goal to facilitate management understanding of the organization's status and guide the implementation of strategy. (American Production and Inventory Control Society (APICS), 2010)

**Supplier.** Provider of goods and services with whom the buyer does business (American Production and Inventory Control Society (APICS), 2010)

**Supplier performance evaluation.** Monitoring and evaluating key suppliers on cost, quality, engineering, purchasing. (American Production and Inventory Control Society (APICS), 2010)

**Supply Chain.** is a system of organizations, people, technologies, activities, information and resources involved in moving materials, products and services all the way through the manufacturing process, from the original supplier of materials supplier to the end customer. (American Production and Inventory Control Society (APICS), 2010)

**Vendor.** Any seller of an item in the market place (American Production and Inventory Control Society (APICS), 2010)

### **Limitations of the Study**

The study was limited to the definition of a supplier's performance tool to measure the performance of supplier providing direct and raw materials. The suppliers subjected to this tool were those suppliers that represented 80% of the annualized spent, supplying to the specific site of Company XYZ, and did not include corporate suppliers.

### **Methodology**

The focus of this study was to identify relevant metrics, to define a supplier performance management tool that can be used to identify areas of opportunity within the supplier base. Upon implementation, the findings will be used to communicate with suppliers, and corporate buyers with the intention to develop action plans and strategies to resolve performance issues and create stronger supplier customer relationships.

## **Chapter II: Literature Review**

This literature review addresses the concepts of Balanced Score Card (BSC) and the importance of control tools to assess the performance of suppliers and the efficiency of the Supply Chain. This chapter reviews the concepts of Balanced Score Card, Supply Chain and Key Performance Indicators. The literature review provides the background and definitions of the topics covered in this study.

### **The Balanced Scorecard**

The balanced scorecard was developed by Robert Kaplan, professor of Leadership at Harvard Business School, and David Norton, president of the company Renaissance Solutions Inc. and consultant in the Boston area (Balanced Scorecard Institute, 1998). During the 1990's Kaplan and Norton led a team that investigated new performance measurement methodologies in dozens of companies in the United States. Companies that used the balanced scorecard were convinced that dependence on economic-financial indicators was affecting performance and the ability to create value.

After discussing a variety of alternatives, the team researcher defined a model that brought together aspects of the entire value chain: customers, internal processes, shareholder concerns, activities of the employees and obviously the economic-financial factors. Kaplan and Norton gave the name of Balanced Scorecard to the newly created model. (Balanced Scorecard Institute, 1998). The Balanced Scorecard (BSC) translates the strategy and mission of an organization into a broad set of performance measures, providing the structure necessary for the implementation of a strategic measurement and management system. (Kaplan & Norton, 1992)

Companies that use the Balanced Scorecard in their strategic management system have two tasks: to build and use it, and these tasks are not independent. Managers beginning to use

their Scorecards for the key processes of management will acquire new insights regarding the Scorecards. The managers will learn which indicators work, which indicators should be modified, and which new indicators, required for strategic success, have emerged and must be incorporated.

Starting in the mid-1990s Fortune 500 companies adopted the Balanced Scorecard and its application has grown increasingly in more institutions of all industries. Initially the Balanced Scorecard was considered exclusive to for-profit organizations. However, the Balanced Score Card has transcended these borders and has been implemented successfully in non-profit organizations, and the public sector in many countries around the world. (Kaplan & Norton, 1996)

The Balanced Score Card measures the performance of the organization from four balanced perspectives: financial, customers, internal processes, and training and growth; perspectives that provide the necessary structure of the model.

Financial indicators tell us something about the history of actions past but fail to provide adequate guidance for actions that must be performed today and, in the future, to create a financial value. The Balanced Scorecard allows companies to keep track of financial results. Over time, the objectives and measures of the Balanced Scorecard should be linked to the achievement of one or more financial objectives. All measures in the four perspectives must be aligned with the vision of the organization and strategic objectives, allowing managers to control, and adjust their strategy. (Kaplan & Norton, 1996)

The Balanced Scorecard provides a way to organize large amounts of complex and related data to provide an overview of the organization, promote effective and efficient decision-making, and continuous improvement. The development of the Balanced Scorecard requires the

identification of several key operational and financial indicators needed to set goals for these organizational areas and select the measures to track progress towards these goals.

The Balanced Scorecard should tell the story of the strategy, starting with the long-term financial objectives, linking them to the sequence of actions that should be carried out with financial processes, clients, internal processes, and finally with employees and systems. It also provides a framework, structure, and language to communicate the mission and strategy when defining the results within the organization. The Balanced Score Card provides a reference for top executives to channel the energies, capabilities and the detailed knowledge of all the personnel towards the achievement of the long-term objectives. (Kaplan & Norton, 1996)

### **The Balanced Scorecard as a Strategic Management System**

Kaplan and Norton mention this model is more than a tactical or operational measurement system. The Balanced Scorecard is a tool used as a long-term strategic management system. The critical management processes in the Balanced Scorecard are (Kaplan & Norton, 1996):

- Translating the vision
- Communicating and linking
- Business planning
- Feedback and learning

Translating the vision: requires that the strategy of the organization is translated into specific strategic objectives, such as financial, customer and market segments objectives. Once this is done, the organization identifies the objectives and indicators for its internal processes, highlighting those processes most important for customers and shareholders. The Balanced

Scorecard is then transformed into an organizational framework for a broader set of management process with a team focus (Kaplan & Norton, 1996)

Communicating and linking: the communication serves to indicate to all employees the critical objectives that should be achieved if to ensure the success of the organizational strategy. The Balanced Scorecard proposes a dialogue between business units' managers, and the corporate directors. At the end of the communication and linking process everyone in the organization must understand the long-term objectives of the business unit, as well as the strategy to achieve these objectives (Kaplan & Norton, 1996)

Business planning: the objectives for the Balanced Scorecard indicators should be for a range of 3-to-5 years. It is advisable to use benchmarking to incorporate best practices and to verify that the proposed objectives reach the strategic measures. The process of planning and managing the establishment of objectives allows the organization to quantify the long-term results that must be achieved, identify the mechanisms and provide the necessary resources to achieve such results, and establish short-term goals for the financial or non-financial indicators of the Balanced Scorecard (Kaplan & Norton, 1996)

Feedback and learning: the Balanced Scorecard allows executives and business units managers to monitor, and adjust the implementation of the strategies and, if necessary, make fundamental changes to the strategy itself. The emphasis on cause-effect when a Scorecard is constructed introduces dynamic thinking systems, allows individuals from various parts of a organization to understand how their role influences others and the whole organization. Organizations must have the ability of dual learning, which is when managers question their underlying assumptions, and ponder whether the theory under which they were operating

remains consistent with the evidence, observations and current experiences (Kaplan & Norton, 1996)

## **Supply Chain**

Chen and Paulraj (2004) propose a framework based on the flow of materials, information and financial resources. The framework serve as an instrument for sustained management of the supply chain through a network of independent relationships developed and adopted by strategic collaboration. This model would represent a set of reliable, valid, and one-dimensional measurements that can be used later in different contexts to expand, or refine the conceptualization and operational measures of a supply chain.

Stadler (2005) proposes that supply chain management should be a task focused in the integration of all organizational units along a supply chain and the coordination of materials, information, and financial flows, required to meet the demands of customers with the goal to improve the competitiveness of a supply chain as a whole. This proposal is depicted as the building blocks of a house and exposing all modules within supply chain management consisting of:

- Foundations:
  - Logistics
  - Marketing
  - Operations research
  - Organizational theory
  - Purchasing and supply
- Pillars and structure:
  - Partners



- Network organization and inter-organizational collaboration
- Leadership
- Use of information and technology
- Process oriented
- Advance planning
- The top
  - Customer service
  - Competitiveness (Stadtler, 2005, p. 576)

An increasing number of companies and organizations pursue continuous improvement as a tool to increase the competitiveness of their business by managing the supply chain.

However, Angappa Gunasekaran (2004) in his article a framework for supply chain performance measurement mentions several companies fail in trying to maximize the potential of the supply chain, because they have failed in the development of metrics and performance measurements. Angappa Gunasekaran emphasizes that the metrics used to measure and improve performance should be metrics that capture the essence of organizational performance. Angappa Gunasekaran proposes that measurements can be classified, according to the degree of impact to the business and the potential of decision of senior management.

Angappa Gunasekaran (2004) proposes the following indicators as examples to measure supplier's performance: Planning metrics, supply metrics, production metrics, and delivery metrics:

- **Planning Metrics**
  - Methods for order entry
  - Lead time for the order

- Order flow
- **Supply Metrics**
  - Supplier evaluation
- **Production Metrics**
  - Available capacity
  - Portfolio of products and services
- **Delivery Metrics**
  - On-time Delivery
  - On time orders filled
  - Perfect orders
  - Flexibility (Angappa Gunasekaran, 2004, pp. 340-341)

Angappa and Kobu (2007) mentioned it is important to specify the purpose of organization performance measurement, and its context to supply chain management. Therefore, the organization should consider:

- Identify if the customer needs and expectations are met.
- Assist the organization to understand its processes, validate what the organization knows and identify what is unknown.
- Identify areas of opportunity, waste, bottle necks, whether these exists and develop plans to improve the areas that need to be addressed.
- Ensure the measurements are the result of facts and not based on emotions, assumptions or suppositions.
- Demonstrate whether the proposed improvements occur and their effectiveness.

Consequently, the importance to develop measurements and key performance indicators (KPI's) that reflect operational ability within the supply chain.

### **Key Performance Indicators (KPI)**

Business organizations need to capitalize on the abilities and resources of the supply chain. The supply chain should be flexible and adaptable to bring products and services to market faster, at the lowest cost, and at the best overall value (Gunasekaran, Patel, & Tirtiroglu, 2001). For that purpose, it is imperative to measure performance and results.

According to Velimirović, Velimirović, & Stanković (2010) key performance indicators are financial and non-financial measures that organizations use to reveal how successful they are in meeting the objectives. At the same time the authors add that to build an effective performance management it is very important to have defined and standardized all processes within the organization.

Parmenter (2015) explains that key performance indicators are the measurements designating the actions required to increase organizational performance, including from his perspective, seven characteristics:

- The measurements are not financial metrics (euros, dollars, etc.).
- Measured at frequent and specific intervals (daily, weekly, or monthly).
- Executed by the CEO or executive management.
- Define with clarity the actions required from the staff (the staff team knows the indicators and is capable to solve discrepancies).
- Tied up different team groups and levels to specific responsibilities.
- Have high organizational impact (affecting one or more success factors).
- Motivate to take the appropriate and adequate actions.

Another key element Parmenter notes is that these measures must be current or oriented toward the future, provide the CEO with the status of the current situation, and act according to the importance. However, to achieve this, the indicator must have been measured and tested to ensure that the results and performance measured meets the expectation.

The Association of Business Process Management Professionals International (<https://www.abpmp.org>) states companies that measure their performance must have goals and standards established to define their metrics in those aspects considered very important or intrinsically attached to the business model. These measures are called key performance indicators (KPI), and to be a realistic indicator, each key performance indicator must be based in a reasonable objective and should change over time in the same degree as the business improves.

Gunasekaran and Kobu (2007) indicate that the most urgent and difficult tasks for managers are to determine the key performance indicators based on the strategic objectives of the organization, and how to measure and put them into practice. In relation to supply chain Gunasekaran and Kobu highlight two types of indicators, quantitative and qualitative. In qualitative terms, an example is given as that of a company that addresses a market of low volume and high variety, which should base its indicators in terms of flexibility and adaptability. However, quantitative indicators such as cost reduction or billing will measure other organizations. Defining key performance indicators plays a critical role in the alignment of organizational goals towards the voice of the customer through stable and predictive processes.

### **Chapter III: Methodology**

The methodology used to design the supplier management tool consisted of five stages. These stages are described below.

#### **Supplier Performance Management Tool Objectives Definition**

During this stage the local business unit defined the objectives of the tool based on its local needs and the type of decisions that will be taken from the measurements and data obtained through the tool application. Therefore, the business unit is considered essential to identify, within the purchasing processes, the main characteristics and requirements during the execution of the acquisition of raw and direct materials and determine the level of support required of the supplier.

Defining a concept of the expected performance of suppliers required an understanding of the different internal needs and expectations that direct the behavior of the company. Furthermore, it was necessary to align all the required attributes to find similarities and points of convergence between the different departments participating in the evaluation of suppliers. To this purpose, a multifunctional workshop meeting that brought together representatives of the different departments interested in the evaluation of supplies was used.

Six managers, one from Purchasing, one from Quality, one from Manufacturing, one from Inventory Control, one from Engineering/R&D, and one from Finance attended this meeting. Additionally, a few internal customers and operators were invited to provide their feedback and input to better understand the needs of the operational levels, which are ultimately the main stakeholders of this process. The participation of internal customers is justified by the existence, of certain cases, in which the planning of purchases is fully carried out by them and

leaving the Purchasing department with the responsibility of executing it and by the constant interaction with suppliers during the stages of delivery.

### **Data Gathering**

Data gathering consisted of a review of external information with the purpose to understand supplier management indicators, and the attributes commonly across different industries. Also, an internal review was performed to gather knowledge of the key, formal and informal measurements, required by the organization as well as the organizational processes and information technologies (IT) tools available to support them.

The gathering of external information included analysis of recommended indicators from recognized Supply Chain and Inventory Control associations such as APICS and the Institute of Supply Chain Management (ISM). The gathering of external information also included a review of key elements of companies having similar purchasing profiles or considered as best practice, limiting the gathering to those whose indicators were available to the general public.

An analysis of the metrics from approximately 10 different sources and recommendations from different industries of production and services, in which the use of suppliers' management indicators, sub-indicators, and attributes (measurement objectives, rating system, frequency of measurement, analysis and recommended decisions based on the possible results) was performed. The analysis was performed concurrently to the external information gathering analysis of the current internal practices utilized to measure the performance of crucial suppliers'.

Concurrent to the external information gathering, an analysis of the internal current practices utilized to measure the performance of key supplier company was executed.

The analysis was initiated through a workshop attended by managers and coordinators from the areas most affected by the proper (or improper) performance of suppliers. The workshop had two participants per area, with a total of six people who collaborated with the collection of internal information from the Purchasing department.

In order to detail the particularities of each area, unstructured interviews were conducted. The interviews were attended by the respective area managers, one coordinator from each area and at least one operator from each one of the stages of the internal manufacturing process and material handling activities. This group of individuals represented the most significant customer areas for the Purchasing department. The analysis and evaluation of the existing processes and IT tools used was done via direct observations; direct observations were also applied to the evaluation of the Purchasing area.

### **Key Metrics Definition**

An analysis of internal and external data was performed during the key metrics definition. The analysis had the purpose to evaluate the data obtained and identify similarities and commonality of metrics that could be used to satisfy the needs identified during the objectives definition. The results obtained were discussed and analyzed in two additional workshops with the Purchasing department with the collaboration of the same team members who participated in the internal information gathering stage.

To guide the discussions related to the definition of indicators, the consensus method consisting of a vote system was used. During the discussion the team reviewed and agreed on the indicators and their respective attributes, such as: sub-indicators or drivers, objectives, type of measurement used (quantitative or qualitative), goals and calculation formulas. During this discussion those responsible for the measurement and analysis were also defined, as well as the

way in which the revisions of the indicators would be carried out, which is an important stage to accompany the use of the system in the future.

### **Data Validation**

It was necessary to validate the set of indicators as a comprehensive measurement tool and explain the function and weight each attribute had in the overall evaluation of the supplier's performance. Data validation was in addition to the continuous data “cleansing” performed through the different stages and that allowed the team to define and select the of indicators and attributes of the tool. An example of the tool was developed in an electronic form via an Excel spreadsheet.

The example allowed modeling thorough the manual input of historical information collected from the business unit archived records, and the main reports used to track spend, deliveries and supplier’s quality data. The results from the model permitted the team to test and validate the result from the ratings of the indicators were adequate to meet the requirement of the local business unit.

Two validation meetings were held. The first meeting was held at the operational level, with the participation the site buyer, and two coordinators representing the client areas (Quality and Finance). The second meeting was held with the local business unit management level and was intended to discuss small adjustments based on strategic purposes.

### **Evaluation of Electronic Systems Required for the Implementation of the Supplier**

#### **Management Tool**

During this stage, the team evaluated the option to buy an information system from the many existing in the market and modify the system to offer the solution required for the business unit. This stage was based on the information related to the ERP (Enterprise Resource Planning)



system currently in place, and the other technological tools used in the management and control of the purchasing processes. The input available via the Enterprise Resource Planning (ERP) system and reporting tools used were identified. Based on this information, budget and resources limitations, it was determined that a locally developed dashboard would provide the data required, and a project for the development of the dashboard was assigned to the local IT team.

### **Summary**

This chapter covered the method used to design the supplier management tool for Company XYZ. The feedback and input from the Purchasing department, internal customers, and operators was taken into consideration when defining the metrics that will become part of the tool. The management team of the local business unit also participated in the definition of the metrics and relevant indicators that would become part of the tool. Additionally, reviewing commonly used metrics from organizations across different industries, as well as the analysis of metrics recommended by recognized organizations such as APICS and the Institute of Supply Management provided the background required to develop the tool. Chapter IV discusses the analysis of the results from the methodology used.

## **Chapter IV: Analysis and Design of the Supplier Performance Management Tool**

Following the logic defined in the research method, this section presents the description and analysis of the results obtained in the study.

### **Supplier Performance Management Tool Objectives Definition**

Based on the requirements of the Purchasing department and the requirements from the internal customers, the following needs were defined (Figure 1):

- Reduce the supplier base so that it includes only providers of assured reliability.
- Classify suppliers according to their performance, identifying those that correctly meet the company's expectations and differentiating which have the characteristics of a “strategic partner” for Company XYZ.
- Establish standardized communication to inform suppliers about their performance level, and encourage their participation in the process of continuous improvement.

Based on these needs it was clear that the supplier management tool indicators would need to support the following decisions:

- Identify which suppliers should not be called for new quotes or tenders.
- Request corrective actions and plans of improvement from suppliers showing signs of performance decline.
- Publicly recognize the best performing providers.
- Limit the number of quotes from suppliers that demonstrate a disproportionate financial dependence of Company XYZ.

Company XYZ needs	Decisions supported by the supplier performance management tool indicators
<ul style="list-style-type: none"> <li>Suppliers' based rationalization, aiming to include only reliable suppliers.</li> </ul>	<ul style="list-style-type: none"> <li>Identify suppliers not qualified to receive further business opportunities.</li> <li>Remove suppliers with unacceptable performance.</li> </ul>
<ul style="list-style-type: none"> <li>Classify suppliers in accordance to their performance.</li> <li>Identify suppliers that consistently meet expectations set up by Company XYZ</li> <li>Regard suppliers whose performance consistently meets expectations as "strategic partners"</li> </ul>	<ul style="list-style-type: none"> <li>Develop strategic relationships only with suppliers' meeting and exceeding expectations, and who specialize on supplying products considered key for Company XYZ operations.</li> </ul>
<ul style="list-style-type: none"> <li>Establishment of a standardize communication method to communicate suppliers performance in relation to Company XYZ's expectations.</li> <li>Enhance and motivate suppliers' participation on continuous improvement workshops and activities</li> </ul>	<ul style="list-style-type: none"> <li>Public recognition to suppliers meeting expectations.</li> <li>Increase business opportunities with suppliers identified as strategic partners</li> </ul>

*Figure 1.* Needs and decisions Company XYZ requires the supplier performance management tool supports.

## Data Gathering

This stage is divided into two types of information: external information, and information of internal origin from the analysis of the needs of internal customers and leadership expectations.

### Gathering of External Information

The indicators and sub-indicators collected were initially organized according to groupings found most frequently among the companies analyzed. The analysis showed that Quality and Logistics and Delivery indicators are present in the majority of companies analyzed. The aspects most frequently assessed in relation to Quality are related to:

- Compliance with product
- Compliance with service specifications
- Quality of production processes

The aspects most evaluated in relation to Logistics and Delivery are:

- On time delivery
- Quantity delivered

There is hesitation to evaluate the performance of suppliers based on economic aspects such as price and costs. Although a few companies used price as an indicator, the majority agreed that the price of the product or service offered does not make a difference between good and bad supplier performance. Indicators related to the strategic relationship with suppliers are less commonly found in the market, indicating that there is inability to assess the levels of collaboration between customers and suppliers. Such a phenomenon is due to the imprecision to define the meaning of “business partner”, and the difficulty in dealing with the subjectivity inherent to this measurement.

Other indicators related to the level of flexibility and organizational management also rarely used in practice, even when organizations usually recognize its impact on the decisions taken. Regarding the qualification methods, the analysis shows that it is recommended to reduce the number of subjective indicators. In practice, it is difficult to eliminate the perception of the evaluator. The use of ratings based on the accounting of non-conformities is another form of measurement that allows the perception of the evaluator to take quantifiable values and it is less subjective. The analysis also showed the need to differentiate the impact that each sub-indicator has on the measurement of supplier performance, since weighted measurement methods are more used than pure measurement methods.

It is interesting that most companies find the need to improve the strategic relationship with suppliers. However, the difficulty in determining and measuring such characteristics makes the use of specific indicators for this to be inconsistent. Among the most used decisions based on the results of indicators we have:

- Supplier suspension
- Supplier substitution
- Number of corrective actions requested
- Quality assurance

These results are consistent with the needs defined in Company XYZ.

### **Gathering of Internal Information**

Initially, it was identified that Company XYZ did not have a formal measurement record that systematically described the behavior and characteristics of the suppliers registered in the approved vendors list. However, the Purchasing department used a series of measurements characterized by being subjective, and inconsistently recorded in physical format such as paper. Such a procedure was did not follow a predetermined measurement and analysis structure, and was considered informal. Despite the insight gained from these sporadic evaluations it was observed that, in general, the purchasing staff was not able to identify or classify their suppliers as “good” or “bad”. The lack of consistency in the information collected led the service personnel to make decisions empirically based on the experience and memory of the buyers.

It was also identified that the Purchasing department performed all the purchasing activities through the company's ERP system. However, departments such as Maintenance and Engineering often performed their own acquisitions via direct contact with suppliers. These interactions took place without the oversight of the purchasing department.

### **Key Metrics Definition**

The proposal of the indicators for the supplier management tool was the result of the triangulation of the analysis of external information and the collection of internal data and documentation of the internal customers' needs.

## **Indicators**

The indicators that satisfied one or more of the company's requirements were included in the proposal. The analysis of the needs and requirements of the company indicated that Quality and Delivery indicators would be part of the supplier management tool. Following the analysis of the strategic and operational decisions of the company, the need to include metrics related to the level of reliability identified. The reliability metrics would allow the company to identify suppliers that can be considered as “strategic allies”.

To assist the Purchasing department, it was decided to establish indicators that meet the needs of the company in a simple way. Therefore, Quality, Commercial, Supply Chain indicators were defined. Establishing the general description of the suppliers' performance would be based on the impartial combination of the indicators.

The reliability characteristics necessary for suppliers to be considered “strategic allies” were obtained from the combination of the defined indicators. Such explanation is detailed later, in the Measurement Analysis section.

## **Sub-indicators**

Sub-indicators consistent with the culture of the company and with the desired complexity in the measurement and analysis processes were chosen. In that sense, the sub-indicators that make up each metric are listed below:

- Quality: Number of rejected shipments, Number of Supplier Corrective Actions, Supplier corrective Actions Responsiveness, Market/Field returns.
- Commercial: Minimum Order Quantity, Lead-Time, Payment Terms, Pricing and Cost Improvement.
- Supply Chain: Delivery, Responsiveness

Some sub-indicators such as service availability, security, invoice errors and adequate packaging did not have a significant frequency of use for Company XYZ. Figure 2 presents the main attributes considered for the description of the indicators and sub-indicators included in the supplier performance management tool.

<b>Objectives, responsibilities and frequency</b>	Attributes were defined for each sub indicator. The descriptions were clear and specific as well as the attribution of responsibilities that considered the level of interaction with the supplier.
<b>Weights</b>	Different weights were given to each indicator. The weights were the result from the internal data gathering, and the experience from buyers and internal stakeholders.
<b>Grades</b>	A final grade scale of 4 levels was defined (0 – 4) in which the worse performance will be graded with the highest level (4) and vice versa, the best performance will received the lowest level (1). This system decreases the subjectivity from the quantitative grades. The quantitative grades (percentage values) are converted through the utilization of a table with defined goals.
<b>Revisions</b>	It was decided to perform Quarterly reviews during the first year following the supplier performance management tool implementation. The decision was driven due to the lack of experience Company XYZ's with supplier performance management, and the current number of suppliers and vendors. As the tool mature and the users and tool administrators familiarize themselves with such, the revisions will be performed semi-annually. It is also recommended to adjust and modify the weights of the tool with every revision, and to better meet organizational goals and strategies.

*Figure 2.* Attributes of the indicators and sub-indicators of the supplier performance management tool.

The indicators, sub-indicators included in the supplier performance management tool and the relative importance or weight for each are noted in (Figure 3).

Business Function	Measurement		Weight (% / points)	Points
Quality (35%)	Shipment Inspection	If # of Reject Lots > 0, Inspection Reject % = (# of Reject Lots - 1) / (# of Total Lots - 1) If # of Reject Lots = 0, Shipment Inspection Score = 100.  Reject Rate                      Score 0%                                      100 0.1% - 1.0%                      90 1.1% - 3.0%                      80 3.1% - 4.0%                      70 4.1% - 5.0%                      60 >5.0%                                  0	30	100
				90
				80
				70
				60
				0
	Supplier Corrective Actions	SCAR Incidents                      Score 0 or 1                                      100 2    80 3    60 4    40 5    20 6 or above                                  0	10	100
				80
				60
				40
				20
				0
	Supplier Corrective Actions Responsiveness	# of occurrence of not response in 1 week OR not fixed in 1 month  Incidence                      Score 0                                      100 1                                      75 2                                      50 3                                      25 4                                      0	10	100
				75
				50
				25
				0
	Market Field Return	12 Months Rolling Return Units / 12 Months Rolling Sale Quantity  Return Rate                      Score <=2.00%                              100 2.01 - 3.00%                      80 3.01 - 4.00%                      65 4.01 - 5.00%                      50 5.01% - 6.00%                      35 6.01 - 7.00%                      20	50	100
				80
				60
				40
				0

Commercial (40%)	Minimum Order Quantity	20' Container	10	100
		Mixed 40'/40' HC Container		90
		One 40' Container		80
		One 40' HC Container		70
		> 40' HC Container		0
	Lead-Time	<30 Days	15	100
		31-40 Days		90
		41-50 Days		80
		51-60 Days		70
		61-70 Days		60
		71-80 Days		50
		81-90 Days		40
		>90 Days		0
	Payment Terms	>90 Days	10	Score will be the actual number of payment term days
		76-90 Days		
		61-75 Days		
		60 Days		
		45-59 Days		
		30-44 Days		
	Pricing & Cost Improvement	<30 Days	20	100
				90
				80
				70
				60
				50
Supply Chain (25%)	Delivery	100% On-Time	70	100
		95%-99.9% On-Time		70
		90%-94.9% On-Time		30
		<90% On-Time		0
	Responsiveness	Within One Business Day	30	100
		Within Two Business Days		70
		Within Three Business Days		30
		> Three Business Days		0

Overall Score (AVG)

Overall rating	Level	Symbol
100 - 75	1	Green
74.99 - 50	2	Yellow
49.99 - 25	3	Orange
24.99 - 0	4	Red

Figure 3. Indicators and sub indicators of the Supplier Performance Management Tool.



## Analysis of the Measurements

Although the aggregate scores of the indicators may take values between 0-and-100, a scale of four possible rating levels was defined to describe the performance of the supplier for each indicator. Each level is graphically identified by means of a characteristic color that facilitates its identification. The combination of the qualification levels of the four indicators of the supplier performance management tool describes the final performance of the supplier. This is classified in six possible areas of performance: best supplier, strategic partner, acceptable performance, needs improvement, probationary status, and not approved (Figure 4).

Level achieved	Status	Suggested Actions
Level 1 at $\geq 90\%$ overall grade		Strategic Partner: Increase business spent and enhance participation on continuous improvement activities.
Level 1 at $\leq 89\%$ overall grade		Preferred supplier: Maintain business level, invite to bid new projects, and enhance participation on continuous improvement activities.
Level 2 at $\geq 65\%$ overall grade		Supplier meets expectations: Communicate areas of improvement. Maintain existing business level.
Level 2 at $\leq 64\%$ overall grade		Supplier needs to improve: Request of detail corrective action plans and continuous progress monitoring. Maintain business level but initiate sourcing activities to reduce spend.
Level 3 all grades		Supplier needs significant improvement: Transition key suppliers to preferred suppliers and Strategic partners. Company XYZ will communicate phase out plan and timeline for completion.
Level 4 all grades		Not approved supplier: Supplier already on last stages of phase out plan. Remove from Approved Suppliers List.

*Figure 4.* Supplier performance definition.

Each performance area is identified by graphic symbols (second column) to facilitate the subsequent analysis of the information.

The performance area called "suggested actions" requires that the supplier, in addition to complying with the best expected performance, present proactive features in relation to offering the best level of flexibility, which in principle is not required to comply. The suggested actions

(third column) correspond to the decisions identified during the tool objectives definition of the method.

### **Validation**

The prototype of the selected supplier performance management tool indicators was developed to validate the functions of each indicator. With the use of 3 months of data points, the entry of manual information and information from the company's ERP system were simulated. It was understood that the actual implementation of the indicators would allow for special filters, in addition to allowing the creation of scenarios through temporary changes in the weights of indicators. During management review meetings it was recognizable the need from internal costumers, and the Purchasing department, to know their suppliers better. For that purpose, a second iteration of weights and goals will be required in a future version of the tool.

### **Evaluation of Electronic Systems Required for the Implementation of the Supplier Performance Management Tool**

The Purchasing department uses an ERP system that controls and integrates not only the operations of the department, but also the operations of all other areas and branches of the company. This platform is the main communication requirement for the electronic system that supports the implementation of the supplier management tool must meet. In addition to having the ability to read and interpret ERP information, the performance management tool software must be able to communicate with the system created specifically to deal with service contracts and export operations.

The main data required for the supplier management tool is concentrated in the ERP system but limited to data required for the Delivery sub-indicator (delivery date and quantity delivered). The input data for the other sub-indicators are manual entries and were not part of

any system. Therefore, it was necessary for the electronic supplier management tool to have the ability to record the information needed for the additional sub-indicators within the databases currently used.

The suppliers of performance evaluation systems observed the problem and recognized the inability to present economically competitive solutions. Specialization of this solution would lead to a significant increase in implementation costs. It was decided that the company's own IT department would carry out the implementation of the system, which would be supported by a dedicated IT Project Manager from within the company.

## **Chapter V: Discussion, Conclusion and Recommendation**

This document presents the stages developed to design a supplier performance management tool from the study of Company XYZ. The work dynamics established with the company was carried out through a five-stage design method: Supplier performance management tool objectives definition, Data gathering, Key metrics definition, Data validation, Evaluation of electronic systems required for the implementation of the supplier management tool.

### **Discussion**

During the process of defining objectives, it was important to ensure the expected performance was consistent at all levels of the organization, facilitating the identification of the main measurement needs, and the decisions that the supplier performance management tool must support. The effectiveness of this stage depended strictly on the active participation of all the participants from all organizational levels.

The collection of information gathered from external and internal sources to the organization facilitated the development of indicators. The indicators are required to ensure the supplier performance management tool would be used for the decision-making process, and it is aligned to best practices used in the market. The supplier performance management tool indicators proposed were: Quality, Commercial, and Supply Chain. Operational requirements from the Purchasing department were considered in the definition of sub-indicators and attributes. The indicators could be used in the future to measure and manage performance of additional supplier or those providing indirect products or services.

The measurement analysis process was facilitated through the use of symbols and colors, expediting the identification of levels and classification of suppliers. Describing the performance of suppliers across all indicators was intended to prevent conflicts for the future creation of

suppliers' subgroups and determining which indicator was most important for each subgroup. The validation process through the use of prototypes, allowed recognizing errors or new implementation requirements in a timely manner. Reviewing and adjusting the indicators is mandatory, which allows the merging between the organizational culture and the recently attached operational activities.

## **Conclusions**

The complexity of evaluating suppliers grows exponentially with the number of variables to control. It is recommended to work with a reasonable number of indicators that cover the most significant aspects of suppliers' performance. It is expected that the implementation of an evaluation system will generate adverse reactions within the company and departments involved. For those departments who already had some form of evaluation, it is difficult to accept that such processes can and should be improved. Such obstacles are mitigated through the participation of senior management. The understanding and commitment of the organization must come from the top management levels and be encouraged at the operational levels.

Another type of resistance may come from external users of the suppliers' performance management tool. These external users are areas indirectly involved in the system implementation processes (IT department), and in the measurement or data collection processes (warehouse, internal customers). These resistances may arise from the conception of an increase in the workload, or complexity of the functions performed and additional control of the operational processes. The support of managers and upper levels is required at all stages of the process. Their support will mitigate any perception that the process is an activity to add additional control at the operational levels and mitigate any risks of sabotage that eventually deteriorates the operation of the supplier performance management tool.

**Recommendations**

The use of as supplier performance management tool particularly supports the development and fulfillment of the Purchasing department objectives, which must be aligned with the objectives of the organization. Other objectives that make up the company's macro strategy must also be supported by specific evaluation systems, which in turn must be integrated with each other. The design of such measurement systems can be initiated through adaptations of the presented methodology.

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