

# Measuring Performance Beyond the Company Boundaries: More a Need Than a Challenge

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## *Abstract*

*In modern companies, measuring and control suppliers' performance is a difficult - but fundamental - task. The adoption of inappropriate supplier performance measurement systems can generate undesired supplier behaviors, that can negatively affect buyer (and supply chain) performance. This paper reviews and addresses the main challenges connected to supplier performance management activities, and proposes a framework – the Strategy, Technology, and Approach model – that prescribes the main aspects to be considered for an effective design, use, implementation, and review of these systems.*

Performance measurement is a crucial activity for businesses. It allows strategy frame into a series of specific objectives and their subsequent operationalization into a limited set of metrics: performance measures, targets, and initiatives to achieve them.<sup>1,2</sup> There are three main sources of powers associated with a performance measurement system (PMS), making it an essential support for decision making:

- ✓ “Control” power: a PMS enables control by disaggregating a complex and multidimensional objective in a limited set of quantifiable performance measures, facilitating a constant control upon the overarching objectives.

- ✓ “Orchestration” power: a PMS has a strong motivational impact, enabling an efficient communication of what really matters, thus catalyzing the focus and efforts of involved resources.
- ✓ “Improving” power: a PMS is the basis to implement plans of continuous improvement, encouraging a progressive refinement in the ability to execute critical tasks to reach established targets.

In the last two decades, increasing outsourcing and offshoring trends have made the operational and business performance of companies dramatically affected by supply chain partners. This has historically posed significant challenges to the performance measurement and management process, which cannot leave aside the effect of external actors.

In the management literature, the successful formula of “supply chain-based competition” has started to spread over, highlighting how companies can no longer neglect relationships with supply chain partners, as they are a source of competitive advantage.<sup>3</sup> In this context, companies struggle to create privileged paths inside their industry network, leveraging relationships with suppliers and customers to build lean and agile supply chains.<sup>4</sup> In this regard, the performance measurement process has to be extended beyond the company borders, first looking upstream at the supply network. As a matter of fact, traditional internal PMSs have long been accompanied by supplier PMSs (SPMSs), aimed at transposing the abovementioned control, orchestration, and improving powers to the relationship between the buyer company and its suppliers. By matching these three “powers,” SPMSs should act as a buyer-supplier relationship regulator and stimulator.<sup>5</sup> This generates both technological and managerial challenges – to put the system in action and maximize the positive outcomes from its adoption.

For an effective implementation, technology is not an issue anymore. Service providers’ offer is wide and diversified; from ICT giants (like IBM, Oracle, SAP, etc.) to minor players and innovative start-ups, companies can choose among various solutions with different cost and functionalities.

Organizational capital – i.e., skills and capabilities needed to use these systems effectively – is another key element to take into account. In latest years, the procurement department has increased its strategic importance within companies and improved its managerial capabilities in parallel.<sup>6</sup> This growth is instrumental to better design, implement, and use SPMSs more effectively.

Though this favorable empirical background, companies still struggle to gain full benefits from the adoption of SPMSs, in terms of an appropriate

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control of suppliers, orchestration of their actions, and constant stimulation of continuous improvement.

This paper resumes principles that the authors tested and refined during their business and research activities in the last 10 years. It has a twofold aim: 1) first, to identify and label some diffused negative practices (and related supplier negative reactions) adopted by buyers in the measurement process; 2) second, to present smart tools and techniques to solve these issues and exploit the full potential of the SPMS.

### **Measuring supplier performance: the three deadly sins**

There are three main mistakes that the buyer company can make when measuring the performance of their suppliers.

*The “lost in translation” effect.* It occurs when there is no complete alignment between the SPMS and the antecedent strategy. This results in the adoption of SPMSs that are not explicitly linked to the purchasing objectives. There can be different causes for this phenomenon, such as:

- ✓ **The absence of a purchasing strategy:** several purchasing departments still do not have a formalized strategy to refer to (intended as a long-term plan shared among internal members and aligned with the business strategy). This compromises the design and implementation of a complete SPMS, able to measure the contribution of the suppliers to the achievement of long-term objectives.
- ✓ **The focus on savings:** in many industries, even where competition is not on price, the purchasing department is still merely seen as a cost center, with the objective to maximize efficiency and reduce costs. As a result, the relationship with suppliers is oriented toward an excessive pressure on price savings and cost reduction, with a lack of focus on other performance dimensions.
- ✓ **The adaptation to standard vendor software packages:** in recent years, the ICT solutions offered by big providers to support purchasing activities has grown significantly, and often entail “on the shelf” packages for supplier relationship management – which include SPMS models as well. When implementing these predesigned solutions, companies often decide to stick with the standard metrics already included in the system, without any customization effort. This basically means that companies are delegating to ICT providers the identification of the relevant performance dimensions to control their supplier relationship management process. While ICT still remains an essential enabler for adopting effective SPMSs, their structure and

characteristics should be shaped coherently with the strategy underneath, not the other way around.

The “*stuck to the metrics*” effect. It refers to the general tendency, within the SPMS adoption, to maintain a strong focus on the design phase of the system, neglecting the other phases of implementation, use, and review.<sup>7,8</sup> Designing the SPMS means answering the “*what to measure*” question, which entails: (1) framing the purchasing strategy into a set of objectives; (2) operationalizing these objectives into a limited set of metrics; (3) organizing these metrics into a measurement framework.

While the design of a proper SPMS is an essential aspect, it is still insufficient for efficient and effective SPMS adoption. Managers should also dedicate time to the other phases of the SPMS lifecycle, namely:

- ✓ **Implementation:** it consists of *putting the system in action*, by processing the information internally and reporting the SPMS externally. Three main activities constitute the SPMS implementation: 1) elementary data collection; 2) performance measures calculation; 3) reporting. A mature implementation relies on the rigorous execution of these activities, and it is deeply affected by the availability of an effective ICT infrastructure. On the one hand, a reliable ICT system allows for higher internal efficiency and effectiveness (reducing non-value-added activities and errors in the data processing and analysis). On the other hand, with a solid ICT infrastructure in place, the measured suppliers feel more protected against the possibility of buyer’s opportunistic behaviors and/or measurement errors.
- ✓ **Use:** it defines *how the buyer uses* the SPMS as an orchestration tool to manage the relationship with the suppliers. It includes activities such as communication management, the launch of performance improvement action plans, and contract management (e.g., incentives, penalties, disputes).
- ✓ **Review:** it refers to the *periodic review of targets and performance* recorded by the SPMS, in order to maintain the measurement tool aligned with the purchasing strategy. The purchasing strategy comes from the business strategy but, being positioned at an operational level, it is more subjected to changes over time. Endogenous and exogenous events (linked to the evolution of the supply chain or the industry in general) must be intercepted on time and should always lead to questioning the validity of the measurement tool currently adopted.

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*The “I design it” effect.* It refers to the buyer’s tendency to limit the involvement of the evaluated suppliers during the performance measurement and management process. Several degrees of involvement are possible, differentiated by the level of interaction with the supplier throughout the SPMS lifecycle phases. There are cases where the SPMS is only adopted internally, with no involvement of the suppliers, and cases where the buyer strictly collaborates with key suppliers to define the SPMS structure, and so the suppliers are involved since the early design phases. Although a high involvement should be the rule, and not the exception, buying companies still adopt an excessively conservative behavior for what concerns collaboration on SPMS design. Several possible reasons lead to this attitude, such as a different power distribution within the relationship (for example, when the supplier has a stronger bargaining position ); a lack of organizational and managerial capabilities (needed to adopt the SPMS as a relationship regulator tool); supplier’s resistance (for example, when there is a negative perception of the measurement tool); technological limitations (for example, when the ICT infrastructure prevents an efficient implementation and reporting). Even when a collaborative approach is adopted, not all the suppliers that are part of the buyer’s supply base should be involved in the same way. A heuristic rule to follow is to calibrate the involvement according to the strategic importance of the supplier;<sup>9</sup> the more strategic the supplier is, the stronger the degree of supplier involvement should be – during the phases of design, implementation, use, and review of the SPMS.

### **Two reactions to be avoided (and prevented)**

Incurring in one or more of the previous sins can generate two supplier’s reactions that the buyer has to ward off for a successful adoption of SPMS, since they can undermine the powers of control, orchestration, and improvement of the measurement tool.

#### ***“I don’t trust!”***

The supplier does not trust how the buyer uses the SPMS. This **lack of trust** can often be related to two motivations: (1) the accuracy of the performance metrics adopted; (2) a divergent perception of the role of the performance measurement and management process. Low accuracy of the metrics usually comes from a not rigorous implementation process. This can happen, for example, when the data collection and performance indicators computation are performed manually. Divergences can occur when buyer and supplier have a different opinion about the SPMS aim and intended use. This can happen, for example, when the buyer aims to use the SPMS as a tool

to initiate a collaborative and open discussion about supplier improvement and development, while the supplier still perceives the SPMS as a rigid control instrument, bound to a top-down logic of assessment.

The lack of trust generates negative consequences. It can result in a stiffening of the buyer-supplier relationships, which prevents the rise of a collaborative climate that can stimulate the design of joint improvement plans on the recorded performance. In order to avoid these dynamics, the buyer should first invest in a mature and thorough ICT infrastructure, able to automate as much as possible the data collection and performance measurement activities. Second, it must be a buyer's priority to demonstrate a formal commitment to the relationship, so that the supplier can perceive the relationship as strategic and characterized by a higher level of relationship maturity. Under these conditions, SPMSs can be used as effective tools to facilitate coordination and communication between the parties and enable the achievement of mutual benefits.

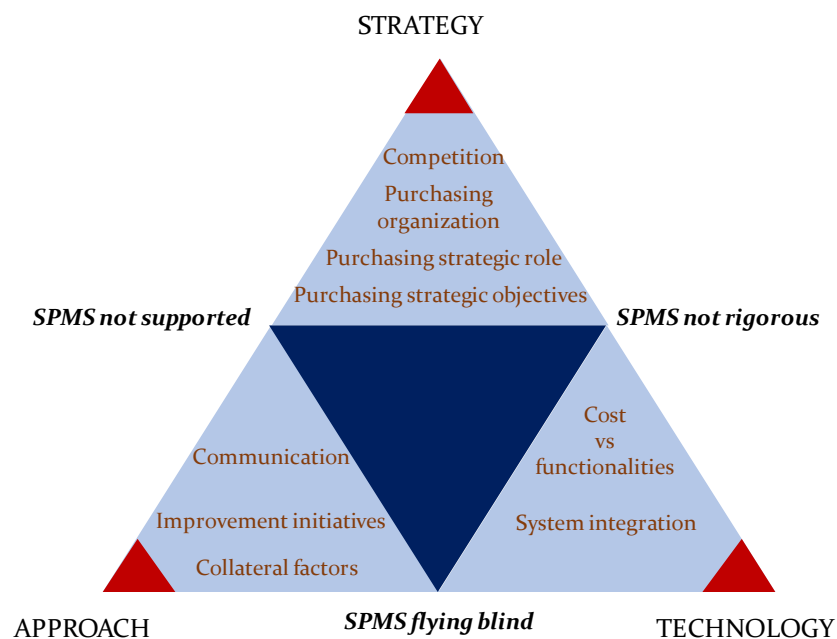
### ***"I don't mind!"***

The supplier is not interested in the performance measurement approach used by the buyer. This **lack of interest** can happen under three main circumstances: (1) the supplier has a high bargaining power compared to the buyer; (2) the supplier already implements an internal system for measuring performance related to the relationship with the buyers; (3) the supplier is part of several SPMSs and decides to focus their attention only on a limited number of metrics, reported by more strategic buyers. The lack of interest from the suppliers often initiates a vicious cycle. In this situation, the buyer would react by using the SPMS mostly as an internal tool (falling into the "*I design it!*" sin), a condition that prevents the possibility to exercise its role of regulator and stimulator for the relationship<sup>5</sup>. When there is a lack of interest, the possibility to change this situation largely depends on the relative power in the relationship. When the bargaining power is very unbalanced in favor of the supplier, it is very difficult for the buyer company to subvert the disinterest of their counterpart. So, it is better to focus the attention on other relationships. Instead, in cases where the bargaining power is more balanced, the buyer can increase the supplier's interest by acting on some elements of the SPMS use, such as a more effective and proactive communication of feedbacks about the performance; the design and implementation of joint improvement initiatives; and/or the inclusion of incentives (and/or penalties) at the contract level, linked to the achievement of specific performance targets.

### Innovation in supplier performance measurement systems: the Strategy-Technology-Approach (STA) model

In order to avoid the three SPMS “deadly sins” and prevent unwanted suppliers’ reactions, we identify three fundamental pillars that should be considered when designing, implementing, using, and reviewing SPMSs: the antecedent strategy (S); the supporting technology (T); the approach kept by the measuring part (A). They realize what we call the “**STA model**” (*Figure 1*). This framework interconnects these three aspects and provides recommendations on the role of the S-T-A components when measuring and managing supplier performance.

**Figure 1.** The STA model



#### **Strategy**

The strategy must be the starting point when developing the SPMS. Otherwise, the company risks to incur in the “flying blind” effect, i.e., making supply network decisions based on an SPMS not connected to a formalized strategy and strategic objectives.

The purchasing strategy definition is a “focus and choice” cascade process,<sup>10</sup> that starts from the business strategy and arrives at a set of objectives linked to supplier relationship management. This process is influenced by the organizational elements connected to the purchasing department's structure (as different functional organizations recognize inputs from the top management differently) and the spending portfolio characteristics (as SPMSs must be differentiated according to the type of

goods/services being purchased). Some of the key questions that need to be answered (as they can influence the characteristics of the SPMS) are:

- *On what is your company competing?* Price or differentiation? And if the answer is “differentiation,” where does your company build the competitive advantage (e.g., quality, innovation, service level)? Different competitive priorities require, in fact, different types of metrics and level of interaction with the suppliers;
- *How is the purchasing department organized?* The characteristics of the functional structure (e.g., more or less centralized) affects how business objectives are perceived and assigned to purchasing employees, and this can determine different roles and responsibilities assigned for the design, implementation, use, and review of SPMSs;
- *What is the role of purchasing within the company?* When purchasing is considered more or less strategic by the company, purchasing employees are expected to achieve different primary goals (e.g., serving internal customers effectively vs. creating a world-class supply base). This, in turn, requires the adoption of different approaches to supplier performance measurement and management;
- *How are purchasing objectives translated into objectives for the different clusters of suppliers?* Understanding how internal purchasing goals are translated into supply network design choices is essential, as the SPMSs (that measure the level of efficiency and effectiveness of the supply network) can then be used as a proxy to assess the ability to achieve these strategic goals.

Answering these questions will help to tie the SPMS to the strategy appropriately. Only at this point, the SPMS design can start, with the assurance of an appropriate translation of the strategic objectives into a limited set of key metrics.

### ***Technology***

ICT represents a fundamental enabler for an effective SPMS implementation. Without a suitable supporting technology, even the most complex SPMS could end up not being useful for decision-making support. Each company should invest time to find the solution that best fits their needs, considering both the available budget and the existing ICT infrastructure. The role of technology is to maximize both the efficiency (by automating activities execution and reducing the need of human intervention) and the effectiveness (by collecting more rigorous and reliable data) of the supplier performance measurement and management process. An adequate ICT infrastructure is fundamental to prevent the discussed “I



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*don't trust!*" reaction from the supplier; unreliable technology, in fact, could decrease the accuracy of the SPMS and, ultimately, deteriorate the quality of supplier relationship management.

According to Gartner,<sup>11</sup> the software providers of supplier performance measurement solutions (part of the Strategic Sourcing suite) is rich and growing. It includes both ICT giants with their last generation business intelligence suites (such as GEP, Jaggaer, Ivalua, SAP Ariba, and Zycus) and minor providers and innovative start-ups offering less complex and more affordable applications (such as COUPA, Scanmarket, Synertrade, and VORTAL). Companies need to understand their needs and take advantage of this wide offer, selecting the solution that optimizes the trade-off between cost, accuracy, reliability, functionality, and usability. Clearly, the main drivers of this decision are cost and functionalities, as the most complete and top-performing solutions would require a higher initial investment in capital and employee training (although able to provide long-term benefits related to the reduction of process execution costs), while the less expensive solutions would offer fewer features.

No matter the decision about the technology, it is important to adopt an SPMS based on a unique ICT system, shared among all the departments involved. In many companies, several departments participate in supplier relationship management activities, and each of them could also contribute to the performance measurement and management process. Adoption of fragmented technologies would create a "silo effect," and generate heterogeneous data and fragmentation of information that should be avoided (or limited) as much as possible.

### ***Approach***

When a clear strategy is defined, and a suitable ICT infrastructure in place, different SPMS approaches can be adopted in order to manage and control supplier relationships. Three main elements have to be considered to build a rigorous and structured SPMS.

### ***Communication***

This first element defines how the communication flow about the SPMS is managed. It consists of defining *what and how to report* the information collected through the SPMS.

Deciding *what to report* means answering the question "*what information do we communicate to the supplier?*" Four different paradigms can be adopted: (1) **No-sharing**: performance data is not shown to the supplier, and communication occurs only in exceptional circumstances (e.g., a drastic performance pitfall or prolonged negative trends). This means that the SPMS

is mainly used with an internal logic. (2) **Synthetic sharing**: the different metrics are aggregated into an overall index (e.g., a number or a letter) that summarizes all the performances evaluated. This index is periodically communicated to the supplier. (3) **Performance sharing with explanation**: all the metrics included in the SPMS are periodically communicated to the supplier. This communication should include an explanation of the relevant elements adopted (e.g., formulas, benchmarks, possible improvement initiatives). (4) **Joint design**: the buyer and the supplier jointly define metrics, so there is no formal need for communication. The supplier knows the SPMS elements, and it is their responsibility to achieve the best value of the metrics jointly designed.

Deciding the *how to report* means first answering the question “*when do we communicate the information to the supplier?*” This communication can take place systematically (i.e., every defined period), or “*una tantum*” (e.g., once per contract). But it also consists of answering the question “*what is the level of depth of the information communicated to the supplier?*” Different levels of visibility are possible: the buyer can decide that the supplier should be given only their performance data, or also their relative positioning compared to other “similar” suppliers (e.g., same good/service provided, or same industry). This scenario leads to the “reporting driving competition” dynamic, where a reporting shared among similar suppliers can raise competitive dynamics in the company supply network.

### *Performance improvement initiatives*

This second element defines the actions to be put in place after SPMS information is collected and evaluated. It consists of defining *what should be changed* to improve the measured performance. In this regard, two main paradigms can be adopted: (1) **top-down initiatives**, where the buyer autonomously decides what should be done and dictates this agenda to the suppliers; (2) **collaborative initiatives**, where, instead, the buyer initiates an open dialogue with the supplier, in order to develop a shared action plan for improvement.

### *Collateral factors*

This third element defines the implications linked to the recorded performance. It consists of defining *what are the consequences* of the SPMS adoption. First, this is connected to the definition of incentive and disincentive policies, where **rewards (or penalties)** are linked to the achievement of pre-defined targets. Strictly related to this, the buyer can also evaluate the possibility of establishing contracts characterized by formalized

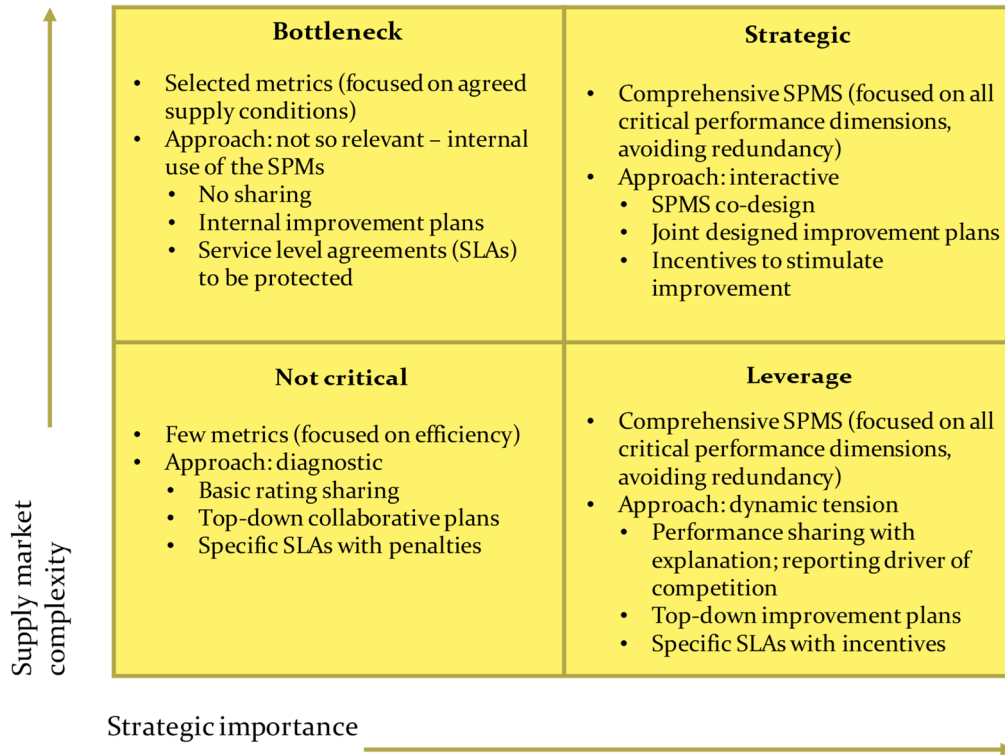
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service level agreements (SLAs) with the suppliers. This, however, would bring the buyer-supplier relationship into the legal ground.

**Adopting the STA model for supplier performance measurement systems: one size does not fit all**

Within the STA models, we have identified and detailed the three pillars to be considered when measuring and managing supplier performance. Achieving the best out of the STA model implies being able to match uniformity with differentiation. When it comes to technology, it is a matter of **homogenization**, since it is important to rely on a unique and integrated ICT system, possibly supervised by procurement professionals, but easily accessible by interested stakeholders. When it comes to strategy and approach, **differentiation** is, instead, the key. Companies buy a heterogeneous set of goods and services, and each of these items calls for a different purchasing strategy. Therefore, the SPMS should be designed by taking into consideration these different strategies. Similarly, the approach to keep could depend on several relationship-specific factors (such as the bargaining power distribution, the mutual trust and commitment, and the nature of the relationship). These also require the adoption of SPMSs with different characteristics.

**Figure 2.** SPMS and Kraljic matrix



It is clear that *one size does not fit all*, and different supplier relationships should be managed through SPMS with different features. In line with this, we can design a framework able to provide practitioners simple guidelines to differentiate their supplier performance measurement and management activities (Figure 2). SPMS decisions should be in line with the strategy prescribed by the Kraljic matrix (the most adopted tool for the management of purchasing spending).<sup>8</sup> This means that, when following the STA model, the decisions on three pillars – Strategy, Technology, Approach – (and the adoption of the SPMSs) should be differentiated between the four clusters – non-critical, leverage, bottleneck, and strategic.

The framework in Figure 1 highlights the existence of two distinct paradigmatic approaches, re-adapted from the internal PMS literature,<sup>9</sup> that characterize SPMSs. The so-called **diagnostic approach** leaves the supplier performance measurement and management process firmly in the buyer's hands, who sets top-down targets and control for their achievement. The buyer's responsibility is also to define the guidelines to be followed and assure that suppliers comply with them. In this case, the SPMS is focused on a few metrics (mostly related to efficiency), and it has mainly the role of regulator and orchestrator for the relationship. This approach to SPMS is particularly suitable for suppliers of non-critical items. The **interactive approach**, on the contrary, favors more collaborative and bi-directional performance measurement and management activities. In this context, the SPMS is comprehensive, and it aims to include several heterogeneous performance metrics. It has mainly the role of relationship stimulator, and it is used to initiate a collaborative discussion with the suppliers in order to identify future actions for improvement. This approach to SPMS is particularly suitable for suppliers of strategic items. We also recognize the existence of a third intermediate option, based on the combination of the diagnostic and interactive approaches, that generates a **dynamic tension**. The buyer needs to have the ability to consciously dose the diagnostic and the interactive approaches, to get the best out of both of them. This allows the buyer to keep constant attention towards target achievement and improvement, while establishing a trustworthy relationship climate. This type of approach is particularly suitable for suppliers of leverage items, where the buyer can use both “stick” (considering the low supply market complexity) and “carrot” (considering the strategic relevance of the item) in the relationship with the suppliers, leveraging on a dominant position. Finally, for bottleneck items, the investments for the identification and adoption of a suitable approach are not a priority, as suppliers of these items are likely to be characterized by the “*I don't mind!*” attitude, considering their dominant position in the relationship.

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This final framework needs to be adapted to each specific company case. The behavior to keep also depends on several contingent factors (e.g., industry, buyer attractiveness), that need to be integrated into the general STA model and in the practical adoption of the SPMS, in order to arrive at the best configuration for measuring and managing supplier performance.

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### Endnotes

1. Kaplan, R. S., & Norton, D. P. (2005). The balanced scorecard: measures that drive performance. *Harvard Business Review*, 83(7), 172.
2. Melnyk, S. A., Bourne M., Frayer, D., & Rifkin, W. (2020). Are your performance measurements destroying your supply chain? *Supply Chain Management Review*, 28-33.
3. Li, S., Rao, S. S., Ragu-Nathan, T. S., & Ragu-Nathan, B. (2005). Development and validation of a measurement instrument for studying supply chain management practices. *Journal of Operations Management*, 23(6), 618-641.
4. Lee, H. L. (2002). Aligning supply chain strategies with product uncertainties. *California Management Review*, 44(3), 105-119.
5. Maestrini, V., Martinez, V., Neely, A., Luzzini, D., Caniato, F., & Maccarrone, P. (2018). The relationship regulator: a buyer-supplier collaborative performance measurement system. *International Journal of Operations & Production Management*, 38(11), 2022-2039.
6. Lindgreen, A., Vanhamme, J., van Raaij, E. M., & Johnston, W. J. (2013). Go configure: The mix of purchasing practices to choose for your supply base. *California Management Review*, 55(2), 72-96.
7. Bourne, M., Mills, J., Wilcox, M., Neely, A., & Platts, K. (2000). Designing, implementing and updating performance measurement systems. *International Journal of Operations and Production Management*, 20(7), 754-71.
8. Henri, J. F. (2006). Management control systems and strategy: a resource-based perspective. *Accounting, Organizations and Society*, 31(6), 529-558.
9. Kraljic, P. (1983). Purchasing must become supply management. *Harvard Business Review*, 61(5), 109-117.
10. Hespington, F. H., & Schiele, H. (2015). Purchasing strategy development: A multi-level review. *Journal of Purchasing and Supply Management*, 21(2), 138-150.
11. Gartner Research. (2018, August 1). Gartner magic quadrant for strategic sourcing application suites. *Gartner*.