Evaluation of critical indicators in the process of acquiring supplies and services LAC-UFPE

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Abstract. In laboratories linked to public universities and accredited by the NBR ISO/IEC 17025, to meet efficiently item 4.6 (procurement of supplies and services) is a challenge that can be accomplished by programming based on historical purchases and services. In this study, we evaluated the critical procurement items to meet the quality management system of the LAC-UFPE: reagents, certified reference material, equipment parts, maintenance and calibration of equipment and instruments. It was found that the most critical item is the certified reference material, the purchase or repair of which must be expedited within 125 days prior to the receipt to occur within the desired period.

1. Introduction
The acquisition of supplies and services, whether in public service or private enterprise, requires planning and management, as poor management of this process has a direct impact on quality, time, cost and risk activities. For testing and calibration laboratories that, in addition to having to meet the requirements of certificates in NBR ISO/IEC 17025 1, develop their activities under public management, such as the federal universities, the challenge is greater. Besides attending to item 4.6 of the standard that requires compliance with internal deadlines (maintenance plans and calibration, intermediate checks and others) and external (e.g., customer satisfaction during the process of selling analytical services or calibration), the rules established by Law No. 8666 2 of the federal constitution for bidding and procurement of public administration must be met. Thus, it is essential for these laboratories meet the time requirements of the acquisition process, i.e., from request until receipt.

For laboratories accredited to ISO/IEC 17025, the understanding of this process is crucial to avoid running out of supplies or unavailability of equipment that may cause noncompliance.

In laboratories that are linked to public entities, procurement processes must undergo the bidding process, which is governed by Law No. 8.666. Although this procedure is necessary so that public resources are spent efficiently, at the same time they lengthen the procurement processes that may bring negative consequences to the quality system. In this work, the process of acquisition of supplies and services for the Laboratory of Fuel, University Federal of Pernambuco (UFPE-LAC) was analyzed. We evaluated the stages of acquisition of certain items in order to establish indicators improve the buying process, in order to identify and act at the most critical steps and ensure compliance with the deadlines set by the system laboratory management system.
2. Methodology

2.1. Data acquisition
A number of historical processes (42) for the acquisition of supplies and services for LAC-UFPE were used, representing the years 2010 to 2012. These represented items most important for the laboratory: reagents, certified reference material (CRM), equipment parts, calibration of equipment and instruments and preventive maintenance of equipment and instruments.

2.2. Process of acquiring supplies and services
The acquisition process starts from the request of a member of the lab to the immediate supervisor. From there, the request goes to the commercial sector of LAC-UFPE, where estimates are requested from suppliers. These estimates constitute input for purchasing decisions by the Foundation for Development Support (UFPE–FADE), which is the administrative entity responsible for the acquisition process of the laboratory. During the acquisition process, FADE evaluates each company's compliance with the regulations. Once the process is complete, FADE generates an order to supply and/or to service. Once the order has been released, the supplier is supposed to deliver the supplies or perform the services by the deadline specified in the order. Upon delivery of supplies or performance of services, FADE generates a payment, while at the same time the commercial sector of LAC-UFPE evaluates the performance of the supplier using a specific form. After this step, the acquisition process is finished.

2.3. Calculation of the time intervals
The acquisition process was divided into four phases. For each phase, we calculated the respective time intervals: one for the internal process, which basically depends on the LAC-UFPE procedures (i.e. (1)) and the other three related to external agents (i.e. (2), (3) and (4)). The four ranges are:

- (1): $\Delta t_1 = (date\ of\ request\ for\ quotes\ from\ suppliers) - (date\ of\ request\ made\ by\ a\ member\ of\ the\ laboratory)$
  This represents the time interval between the day someone made the request to the commercial sector of LAC-UFPE and the day on which the sector requested proposals from suppliers.

- (2): $\Delta t_2 = (date\ of\ entry\ protocol\ of\ the\ acquisition\ process\ in\ the\ foundation) - (date\ of\ request\ for\ quotes\ to\ suppliers)$
  This represents the time interval between the day the commercial sector of the LAC-UFPE requested proposals from suppliers and the day on which the request was sent to FADE.

- (3): $\Delta t_3 = (date\ of\ release\ order / delivery\ by\ the\ foundation) - (date\ of\ entry\ protocol\ of\ the\ acquisition\ process\ in\ the\ foundation)$
  This is the time interval in which the FADE evaluates the performance of each company with the regulations and generates an order to supply and/or service to the chosen supplier.

- (4): $\Delta t_4 = (date\ of\ receipt\ of\ application) - (date\ of\ release\ order / delivery\ by\ the\ foundation)$
  This is the time in which the supplier carries out the request after authorization by the FADE.

In the first time interval, the commercial sector of LAC-UFPE has a greater responsibility as it is in a position to identify potential suppliers and write up the formal request using the technical language required.

In the second interval, the swing phase depends on how quickly the suppliers submit proposals to the LAC-UFPE commercial sector, so that these can be forwarded to the purchasing department of FADE, so that there is continuity in the acquisition process.

In the third time interval, the internal procedures are recorded at FADE. At this stage, the LAC-UFPE commercial sector awaits the completion of the acquisition procedure and the release of the request for a contractor to be authorized to provide the material or perform the service.
In the fourth interval, the supplier is largely responsible, because the foundation has authorized the delivery of the service or supply of material. Thus the time involved depends on when the provider can perform the service or deliver the material. In some cases, because of the length of time between the original request from LAC and the authorization by FADE, the supplier no longer has the material required on hand.

3. Results

3.1. Acquisition of reagents

All stages showed a short time interval in the acquisition of reagents (figure 1) because of the large number of reagent suppliers on the market. Because it is a procurement item with high demand (which forces a greater internal control, causing the $\Delta t_1$ to be lower), there are a greater number of offers (which favors the reduction of $\Delta t_2$). The incidence of many suppliers leads to a faster processing of the process within the foundation (reduction $\Delta t_3$).

![Figure 1. Evaluation of the process of provision of reagents.](image)

3.2. Acquisition of certified reference material

In this case (figure 2), the critical point is the low inventory of these products available on the market and the small number of suppliers for some of the certified reference materials (CRM’s). As many of the CRM’s used in the laboratory are imported, national or international suppliers that offer this type of product may have reduced inventories, which make delivery time slow (higher $\Delta t_4$). As there is little availability of certain types of CRM’s on the market, the acquisition process becomes slower (higher $\Delta t_3$) due to the low number of suppliers participating in the process. In this case, there was a period of 125 days for the request to be met.
3.3. Acquisition of pieces of equipment
As equipment parts are mostly standardized and supplied by a single representative, this explains the low value of $\Delta t_2$ (figure 3). The predominant range was $\Delta t_4$, owing to low stocks of specific imported parts.

3.4. Acquisition of calibration service equipment and instruments
Because LAC-UFPE is an accredited laboratory calibrations of equipment and instruments should be carried out by laboratories belonging to the Brazilian Calibration Network (RBC). Thus, there is a restriction on the number of suppliers. In addition, as services are provided through scheduled visits, how few certified suppliers scheduling it takes a long time to schedule a visitation. All these factors contribute to a high value for $\Delta t_4$ (figure 4).
3.5. Acquisition of preventive maintenance service of equipment and instruments

Unlike what occurs in maintenance services (which has a smaller number of companies able to offer the service) and the supply of parts, most of which can be acquired by waiver of bidding, the acquisition of certain equipment maintenance services requires the participation of a larger number of suppliers. But many of them do not possess the necessary qualification (figure 5), which increases the process time (greater $\Delta t_3$). Moreover, as the service is also subject to the availability of technical maintenance, some processes have specific deadline for service completion (most $\Delta t_4$).

![Figure 4](image4.png)

**Figure 4.** Evaluation of the process of the calibration service.

![Figure 5](image5.png)

**Figure 5.** Evaluation of the process of preventive maintenance of equipment and instruments.

From the comparison between the five (5) items evaluated, we observed a lower overall acquisition time for the purchase of reagents (55 days). This is explained due to a high demand and ample supply for this item. On the other hand, for the purchasing CRM's, which have less demand and less supply,
the overall acquisition time was 125 days, demanding greater control by the laboratory. For other items, the total acquisition time was the same (77 days). This can be explained by their similar values of demand, supply and technical skills.

4. Conclusions and final considerations

From the indicators raised, it was observed that the most critical item for purchase in the LAC-UFPE is the certified reference material which requires careful attention to planning for the purchase of this item.

In general, it is observed that the most critical intervals are 3 and 4, where there are bureaucratic procedures that must be followed and the FADE deadlines established for the suppliers have a great impact. In these intervals, the laboratory can act giving greater technical assistance to FADE for the indication and evaluation of suppliers; and in interval 4, the commercial sector can intensify the action on the part of the suppliers to comply with the deadlines that have been set. Intervals 1 and 2 can also be optimized to contribute to the decrease in average total time of the process by reviewing internal procedures, checking the availability of financial resources with senior management, paying greater attention to procurement planning, and in the searching for new suppliers.

Based on the results obtained, this work provided to members of the LAC-UFPE a greater understanding of the acquisition process and, consequently, information for more consistent prior planning. Thus, compliance with deadlines for maintenance or even intermediate checks for testing may be warranted. In addition, the commercial sector will have available an indicator that permits monitoring the procurement process, their most critical ranges and maintenance.

References

[1] BRAZILIAN TECHNICAL STANDARDS ASSOCIATION. NBR 17025: General requirements for the competence of testing and calibration laboratories. Rio de Janeiro, 2006.

[2] BRAZIL, Law n. 8,666, of June 21, 1993. Regulates article. 37, XXI, of the Federal Constitution, establishing rules for bidding and contracts for Public Administration and other measures. Official Gazette, Brasília, DF 22 June 1993. p. 8269.