

# Development of Control Technologies in the Corporate Procurement System

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**Abstract.** The article considers the problem of increasing the efficiency of corporate procurement that based on the development of a methodology for their control. The authors propose to introduce preliminary estimate (budget) control, acting on the basis of unified estimate (budget) software, into the procurement control system of production companies. This management decision allows not only to reduce the cost of procurement estimates through independent evaluation by their controller, but also to overcome the organizational conflicts that cause the opportunistic behavior of procurement participants. The author's approach to the internal control of corporate procurement involves their classification in five areas. The control process itself is divided into four stages: analysis of the initiator's application; analysis of procurement documentation, requirements for participants, execution of procedures; analysis of technical specifications; cost justification analysis. Significant controlled parameters have been identified for each stage that allow refinement and implementation in a particular company.

## 1. Introduction

Efficient management of expenses on material and technical support (MTS) of production by works, materials, components and services is one of the key conditions for modern enterprises to form competitive market prices for manufactured products and it requires constant optimization, since almost all expenses of the enterprise (excluding tax payments and payroll) go through the procurement process. The cost of inventories in production systems can reach 40% and the share of MTS costs often exceeds a quarter of their value. The reduction of this item of expenditures is inextricably linked with improving the quality of planning repair programs for technical re-equipment and reconstruction, planning management of procurement of works and services, supply of resources, improving the technology of individual business processes. The organization level of processes for the formation of orders for material and technical and other resources (hereinafter referred to as the MTR), their procurement, delivery, distribution in the production system and storage directly affects the efficiency of the company in general.

At the same time, analysis of most of the industrial companies in Russia that was conducted in industry and regional contexts revealed an imperfection, and in some cases a complete lack of control in procurement management systems. An ineffective control system is the reason for numerous conflicts of participants in the procurement process and their opportunistic behavior, which in turn

affects the production and financial performance of the company: it causes an increase in costs, misuse of working capital, accumulation of receivables and payables, excessive increase in inventories and other.

The problem of control over corporate procurement is directly related to the reform of control and supervision activities carried out in Russia from 2017 to 2025. As a priority criterion it puts forward the criterion of risk-oriented activities. This means that the tasks of reducing risks and improving procurement business processes as well as subsystems for monitoring their implementation are coming to the fore. The importance of finding timely solutions in this area has determined the choice of research topic.

## **2. Relevance, scientific significance of the issue with a brief review of the literature**

Modern Russian manufacturing companies (usually large integrated operating or holding companies) are characterized by the absence of clearly regulated control technologies in procurement business processes, which are zones of rather high risks. The absence of such control leads to the closeness and "opacity" of the procurement business process; unscrupulous or erroneous actions of personnel; excess spending of funds of companies. The relevance of the study determines a number of identified problems in the organization and control of the procurement process that reduce the effectiveness of the procurement:

- the slowdown in the turnover of working capital as a result of excessive inventories of material resources due to the desire to avoid their shortages;
- inefficient and insufficient use of the services of professional logistics intermediaries;
- the predominance of the transit form of supply, despite its low reliability and the duration of the supply;
- excess costs in the supply chain, due to the desire to minimize costs in a separate area, leading to the selection of a supplier according to the minimum price criterion, excluding the total logistics costs;
- poor coordination of the activities of logistics services in network companies, the lack of systematic application of mechanisms and methods of supply management;
- irrational structure of logistics, low level of centralization of procurement; lack of competencies in the field of material and technical support, including the lack of specially trained personnel;
- underdeveloped corporate culture in the field of procurement;
- corrupt actions of management and staff abuse in the procurement of material and technical and other resources [3].

Among the works devoted to the problems of organizing the procurement of production resources, one can point to foreign works on the problems of finding ways to reduce costs in the field of supply management by E. Deming, D. Tixier, X. Firon, M. Linder.

In the post-Soviet years, the problems of the theory of supply chain management of materials and equipment were considered by such foreign researchers: D. Wood, D. Wurdlow, D. Johnson, E. Mate, D. Magee, P. Murphy, E. Nicole, M. Porter, D. Waters, R. Handfield. Studies of Russian scientists on various aspects of procurement management are presented in table 1.

**Table 1.** Aspects of procurement management and their research in the works of Russian economists.

Studies and their authors	Aspects of Procurement Management							
	Procurement organization	Procurement control	Procurement innovation	Conflict of interest and opportunistic behavior of	Procurement Classification	Procurement Management Models	Features of purchases in business groups	
Gusev A.G.	-	-	+	-	+	+	+	
Zabelina O.B.	+	-	-	-	-	+	+	
Okolelova E.Yu.	+	+	+	-	+	-	-	
Portnov K.V.	+	-	-	+	-	+	+	
Soloviev D.E.	+	+	+	-	-	+	+	
Smolyago S.V.	+	-	+	-	-	+	+	
Kozlov E.A.	+	+	+	-	-	+	-	
Belokrylova O.S.	-	-	-	+	-	+	-	

### 3. Formulation of the problem

The main goal of the study is to develop the foundations of building an organizational control mechanism in the corporate procurement management system of material and technical resources of enterprises, as well as to search for ways to reduce the entropy of the production system as a result of the development of control technology mechanisms in corporate procurement management.

### 4. Theoretical part

One of the key objects of control in the implementation of corporate procurement are cost estimates for their implementation. In this situation, the following main types of conflicts of interest appear:

- intra-organizational conflict at the local level, due to the fact that its head is at the head of two services at the same time - the internal customer and internal controllers;
- conflict of interests of affiliates, when representatives of the conflicting parties are related to each other through family, friendly, domestic and other extra-organizational relations.

In the latent phase, conflicts are manifested through the opportunistic behavior of workers, which greatly complicates the quality work of internal controllers. Prevention of this kind of conflict is possible in the organizational model, which provides for various cross-control in the regional context: when the surveyors-inspectors of one region check colleagues who form the estimates in another region. To implement this condition, it was necessary to create a unified information environment, the IT space of which became the basis for inter-regional controlling interactions. This approach completely eliminates the conflicts described above. Obviously, its implementation will have an effect in the conditions of automation of budget planning processes at the corporate level. Therefore, the functioning of the corporate control space on the basis of the unified estimated software (UES) implied the creation of supporting documentation, automation of the estimate planning process and monitoring of the estimated cost control.

The experience of applying this methodology revealed typical violations detected during the

verification of budget documentation, among which the following are most often encountered:

- the volumes of work and materials indicated in the estimate do not correspond to the developed project;
- cases of incorrect use of quotations are common when indirect quotes and / or quotations that are most suitable for the composition of work are used in the estimate;
- in the estimates are unreasonably applied increasing factors;
- the cost of resources provided by the estimate does not correspond to the cost of resources in cost monitoring reports submitted by the branch;
- work in the estimates are duplicated;
- inflated prices apply.

The result of the approach to the formation of the planned cost of work and services you can see here:

1. The methodological basis for determining the estimated cost of work (services) has been developed.
  2. Implemented a unified software system (USS) with the creation of a single repository of estimates.
- As a result:

- the work of affiliates in the formation of estimates is organized in a single electronic space according to uniform rules;
- due to the use of a single storage reduced labor costs for the preparation of estimates;
- information storage is streamlined due to a specially created hierarchy of folders, providing the ability to track estimates from the planning stage to the stage of confirmation of the fact of execution (drawing up an act of work performed).

3. A cross-checking mechanism has been implemented that provides control over the formation of the cost and correctness of the applied prices, which reduces the likelihood of a conflict of interest and opportunistic behavior of procurement participants (Figure 1) [4].

To increase the effectiveness of internal control of procurement, a classification of its areas is required, taking into account the specifics of the procedures for checking proposals for the procurement of various types of material and other resources and the purpose of the purchased resources.

The study analyzed the features and algorithms of internal control during the procurement of various types of material and technical resources and identified resource groups (procurement directions), the procurement of which is controlled by the same algorithms.

Five areas of internal control are established for corporate procurement, in each of which control is carried out according to the same type of algorithms and based on similar controlled parameters. These include:

1. control of the procurement of raw materials, basic materials and energy resources;
2. control of the investment program (procurement of construction and installation works, material and technical resources);
3. control the purchase of software and other IT resources;
4. control of the procurement of materials for repair, technical re-equipment, modernization and operation of fixed capital;
5. control of estimated documentation.

Each of these groups is different:

- the type of market in which the resource is purchased;
- the degree of influence of technical documentation on the purchase conditions (restrictions determined by technology and equipment design);
- the likelihood of the participation of intermediary suppliers;
- the most characteristic procurement initiator;
- the conflict of interest and opportunistic behavior probability of procurement participants.

On this basis, a list of controlled procurement parameters can be compiled during the examination of applications; various types of resources depending on the organizational conditions of the

procurement, the characteristics of its initiator, the degree of probability of conflict of interests of participants, as well as the possibility of resistance and creation of obstacles for their procurement (Table 2). A situation is widespread when during the purchase process only the cost parameters of the purchased resources and associated costs are controlled. Monitoring of other parameters is carried out haphazardly and occasionally, which does not allow to make the optimal purchase decision in a timely manner and in many cases leads to an excess of its cost.

**Table 2.** Controlled procurement parameters in the examination of applications.

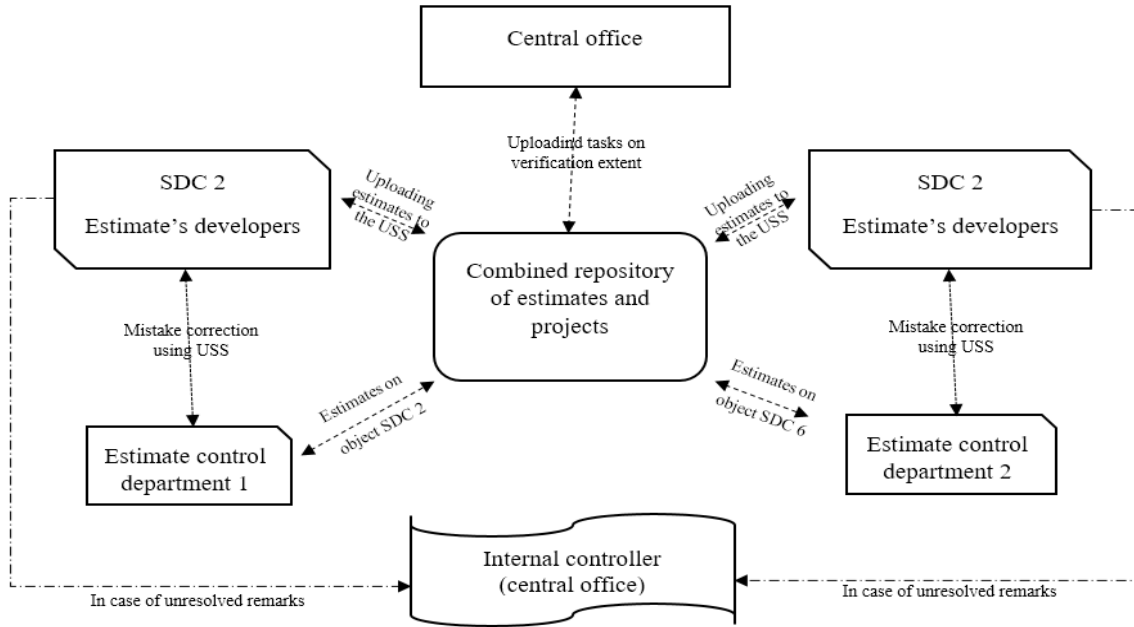
Stage (type) of control	Monitored parameters
Analysis applications initiator	Checking applications for compliance with the form established by local regulations (LNA) and the presence of all additional supporting materials. Check for approvals required by the LNA. Checking the rationale for choosing a procurement method for compliance with the requirements of the Procurement Regulation. Checking the availability of the established LNA approval for unscheduled procurement
Analysis purchasing documentation requirements for to the participants execution procedures	Checking the procurement documentation for completeness, correct execution, compliance with the requirements of the law and the LNA. Analysis of requirements for participants and documents confirming compliance with these requirements for competition restrictions. Verification of compliance with the requirements of the technical specifications and procurement documentation. Checking the compliance of the evaluation and selection criteria, weighting factors with the requirements of the VLA. Analysis of the list of potential suppliers / contractors for an additional targeted invitation to participate in the procurement. Checking the compliance of the list of experts involved in the assessment with the requirements of the VLA. Checking the reasons for non-participation of manufacturers in the procurement. Verification of compliance of draft decisions with the legislation on procurement and LNA. Verification of the approval of the procurement authority of previously concluded contracts and additional agreements
Analysis technical tasks	Checking the quality of technical specifications (including the compliance of the volume of work with estimates). Analysis of technical specifications for unreasonable restrictions on competition
Cost Case Analysis	Checking the cost of services for the correct application of prices and the validity of the cost of materials indicated in the estimates. Checking the availability and quality of market research. Comparative analysis of product purchases in the previous two years

An optimized scheme of the mechanism for cross-checking estimates in the process of corporate procurement is presented in Figure 1.

**5. Practical relevance, suggestions and implementation results, experimental research results**

The implementation of the cross-validation scheme using the unified estimated software presented in Figure 1 was carried out from 2015 to 2018. The experience of its use has shown the effectiveness of the author’s approach to the organization of control in the company’s corporate procurement system. If, prior to its implementation, the employees of the budget control department, who checked the estimates of their regional division, found errors, violations and overstatements in the formation of estimates of less than 1% of the total cost, then when these same people began to check estimates from another region, the corresponding result was about 8- 10%.

As a result of introduction of the author’s approach to the control of procurement activities, a cross-evaluation process of estimates based on a software product was implemented, which allows simultaneously involving more than 1,400 employees of geographically distributed units.



**Figure 1.** The mechanism of cross-checking estimates in the process of corporate procurement.

This led to a reduction in labor costs for the creation of budget documentation and simplification of the operational work of subsidiary dependent companies (SDCs) related to procurement.

So, in the period for 12 months of 2017, 311 issues were submitted for consideration by the special commission. Of these, on 135 issues (43%), procurement initiators corrected draft decisions or drafts of agreed materials in order to eliminate the controller’s comments. For the same period, 12 months, 843 issues were submitted to the procurement center, of which 355 were addressed (42%) the cost has been changed (usually reduced) and draft procurement decisions have been finalized according to the controller’s comments.

The main comments made by the controllers during the verification of estimates include:

- lack of justification for the use of coefficients that take into account the complicating factors of the work (there are no corresponding instructions in the project documents);
- incorrect use of prices, leading to an increase in the estimated cost;
- prices for purchased resources are inflated;
- “double count” - inclusion in the estimates of works previously included in other quotations.

**6. Conclusions**

The study allows us to draw the following conclusions and formulate universal recommendations to improve the efficiency of functioning and control in the procurement systems of manufacturing companies:

1. Purchases are a set of management mechanisms and processes that directly affect the competitiveness, stability of operation and value of the company.
2. The proposed classification of areas of internal control in the corporate procurement system, based on the mechanism for checking proposals for the procurement of various types of material and other resources, made it possible to substantiate the list of controlled procurement parameters depending on its organizational conditions; features of its initiator and the likelihood of opportunistic behavior of the initiator and procurement participants.

3. The developed decision-making method in corporate procurement based on the preliminary budget control mechanism, providing for the presence of an internal customer initiating the procurement; independent controller and decision maker at all stages of competitive procurement, minimizes the likelihood of conflict of interest and opportunistic behavior in the procurement process.
4. The mechanism of cross-checking corporate budget documentation and the interaction of procurement participants enables integrated companies with branches to create a unified repository of estimates and projects, as well as extraterritorial budget control centers, the work of which is organized on the basis and using the unified budget software.
5. In case of neglect by the customer of the methods of engineering and economic design and cost management of products, in the purchase there is a risk of overstating the cost of the finished product, since the project documentation does not contain alternatives in terms of components, assemblies, parts, etc., implying the possibility of forming a competitive price. For this, it is necessary, firstly, to establish cost management even at the stage of designing the finished product, and, secondly, to create a “transparent” pricing system for the products of the supplier and its sub-suppliers. At the same time, work on the cost of the product should be carried out jointly with suppliers.
6. The procurement volumes for suppliers and their sub-suppliers must be consolidated in order to obtain the optimum price for the enlarged lot by the customer.

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