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# System for Monitoring the Quality of Services Provided by a Public Institution Based on Business Processes

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**Abstract**

Monitoring the quality of the services provided by public institutions is an important element in improving the effectiveness of the entire system of public services in the Russian Federation. As a rule, monitoring is associated with obtaining quantitative indicators of the level of satisfaction of citizens which characterize the quality of services provided. Monitoring results are the basis for modernizing the service management system. However, this approach allows us to evaluate only one side of the process by which a public institution renders services to the consumer of services (citizens). The other side of the issue is related to monitoring the processes of the institution itself. This direction also allows us to find approaches to improving the quality of service delivery, and to make the work of a state institution more efficient.

This article describes the methodology for monitoring the process of providing services in a public institution based on business processes. The description of the activity of the institution in terms of the implementation of services is presented in the form of a set of business processes. It is shown that the main element of business processes that can be measured is the time of their implementation. On this basis, a mathematical model for assessing the quality of public service delivery is constructed, including both qualitative assessments (obtained from experts and clients of the institution) and quantitative assessments of the quality of service delivery based on measuring the time of business processes. The quantitative aspect of the proposed methodology is directly related to the main direction declared by the Government of the Russian Federation – the development of digital economy. As an example, the article considers such a state institution as the Social Insurance Fund of the Russian Federation.

## Introduction

For any public institution providing services, the relevance of monitoring in the field of public services [1] should be transparent and effective. Transparency for the client and the employee of the institution implies the existence of clear and uniform regulations which are based on state standards and laws. These regulations define clear rules for the process of obtaining and providing services, all of which eliminates the subjective approach and minimizes the level of corruption. On the other hand, the clarity of the service delivery process leads to an improvement in the efficiency of service delivery, reduction in time expended and reduction of related financial costs, without loss of quality. The clearness of the process of service delivery should also lead to an improvement of the validity of management decisions [2]. However, understanding responsibility and the regulatory framework does not always result in a positive result, since the implementation of the service delivery process is related to the qualifications and responsibilities of each specialist.

If there is a team of specialists, it is necessary to monitor the process of rendering services to clients. As a rule, such monitoring is carried out by specially created expert commissions at a given periodicity (for example, once every three years). The result of the work of such a commission should be a conclusion (mainly qualitative) leading to the improvement of the processes of rendering services in a public institution.

The introduction of monitoring results into service delivery processes is difficult to implement [3], since they are related to the personality of each employee. In this regard, the qualitative component of the assessment is, as a rule, somewhat subjective, and therefore there is the possibility of conflicting opinions and decisions. In this regard, we note that the achievement of quality and accessibility of services in public institutions in foreign and domestic literature are not sufficiently detailed. There are no indicators that would characterize the process of the employee's activities in a uniform manner, and which do not lead to an incorrect, contradictory interpretation.

## 1. Statement of the problem

The rapid development of modern society leads to the need to search for new approaches to management in the provision of services that would be based on parameters related to the type, dynamics and level of change [4]. Known approaches that have been developed for industrial and commercial enterprises [5] are not suitable for public institutions because of the underlying financial component of their activities. Nevertheless, for all types of enterprises and institutions, assessment of the state, analysis and adoption of effective management decisions is impossible without modern mathematical approaches to the management process organization, as well as using modern information technologies for data collection, processing and analysis.

The necessity of applying mathematical and information methods [6, 7] and technological solutions will allow us to:

1) increase the number of management objects, due to the technological base of data collection and the possibility of using artificial intelligence systems;

2) expand the scope of the vision of business processes, which will increase the accuracy and timeliness of decision-making at all stages of the service delivery cycle;

3) to form not only operational, but also tactical and strategic managerial decisions, on the basis of an analysis of the current information on the process of rendering the service, at the levels of the particular employee, the unit and the institution as a whole.

One of the known approaches to assessing the state of various processes of activity developed in mathematical and programmatic terms is the technology of workflow [8]. This technology allows you to ensure the performance of production tasks in strict coordination among themselves, performers and customers on certain rules, based on an abstract representation of work processes. As a rule, the implementation of this approach is carried out in the form of a workflow system when the result of the processes is those or other documents. The disadvantage of such systems is a weak possibility to optimize the workflow system, which each time needs to be adjusted not only for the type of activity, but also for executors and customers. Therefore, we are developing an approach that makes it possible to add new elements in the chain of developed or existing workflow systems that expand the analytical capabilities of such systems.

These and other possible positive aspects of the application of modern methods in the field of making managerial decisions are impossible without accurate and timely data. This article presents a methodology for monitoring the quality of service delivery in a public institution which is based on the measurement of time parameters of business processes [9]. It should be noted that despite the ability to measure the temporal parameters of work processes, it is obvious that at present there are no methods in the regulatory documents describing the corresponding algorithms. Only temporary restrictions are known that are imposed on processes (for example, as stated in Decree of the Government of the Russian Federation from 22 December 2012 No. 1376 "On approval of the rules for the organization of multifunctional centers for the provision of state and municipal services", the time for rendering the service should not exceed 15 minutes).

The proposed methodology for monitoring the quality of service delivery in a government agency, on the one hand, will allow the management to see in real time the conditions of the institution at the tactical level, and each individual employee at the operational level. On the other hand, this information will make it possible to formulate management decisions in a precise and timely manner [10, 11], identify problems, obtain their quantitative description at a given level of regulatory constraints, determine possible solutions, and monitor and evaluate the results of the decision.

## 2. Service in a state institution

The service of an employee in a state institution is a heavily regulated business [12]. This circumstance causes the problem of personal skills realization in a time of rapidly changing environment. The employee must constantly adapt to various changes, improve skills, master new modern technologies to solve the problems of the institution. At the same time, the employee experiences influence from the management when forming orders, and from clients for whom services are rendered. In general, the client's opinion is crucial, and for this the quality and timeliness of providing the service is important [13, 14].

In any state institution, there are certain temporary cycles within which the employee is permanently operating: 5 years, 3 years, a year, a half year, a quarter, a month, 10 days, a week and a day. This is a statutory set of deadlines connected to the performance of a certain work type required to provide services, as well as for the professional growth of employees. The legal basis for monitoring the quality of the provision of public services by the Social Insurance Fund is set out in:

✦ Federal Law dated 27 July 2010 No. 210-FZ "On the organization of the provision of state and municipal services";

✦ Federal Law dated 2 May 2006 No. 59-FZ "On the procedure for considering applications from citizens of the Russian Federation";

✦ Federal Law dated 29 December 2006 No. 255-FZ "On compulsory social insurance in case of temporary disability and in connection with maternity";

✦ Federal Law dated 24 July 1998 No. 125-FZ "On compulsory social insurance against occupational accidents and occupational diseases";

✦ Decree of the Government of the Russian Federation dated 16 May 2011 No. 373 "On the development and approval of administrative regulations for the performance of public functions and administrative regulations for the provision of public services."

Let us consider, for example, a governmental institution, such as the Social Insurance Fund (FSS) (http://fss.ru). Currently, the FSS has a functional form of managing the organization as a whole consisting of several categories of employees: specialist, lead specialist, chief specialist, etc. The distribution of the workload for employees providing public services is, as a rule, uniform, according to the number of policyholders on the list.

We will show that the existing form of distribution of the workload makes it possible to service all insured persons during the period of rendering the service "Acceptance of 4FSS calculation." For example, let us assume that in one of the departments of the FSS each of the specialists serves 1000 insurers (organizations). If we assume that the working hours of FSS employees are 8 hours a day, the time taken to render the service (in a formalized form, the business process) "Acceptance of 4 FSS calculation" is on average (for all quarters of the year) 16.25 work days. The FSS regulation specifies that the time for providing a public service is no more than 15 minutes per one policyholder (client). Having temporary data on the reception of a public service, it is possible to make calculations of the time necessary to carry out the business process "Accepting 4FSS calculation" (service provision) per specialist, on average, without considering the specialist category. The total working time is 7,800 minutes (16.25 working days × 8 hours × 60 minutes). So, it takes 7.8 minutes in average to provide this kind of service for 1000 insurers (organizations), without considering potential time losses (consultations, instructions of the supervisor, rest, etc.).

All employees of state institutions are divided into professional categories, depending on employment time in the current position and the effectiveness of their work, which is expressed in the average time of the provision of public services. Let us consider the results of those differences.

For the "Specialist" category (work experience from 0 to 1 year), the typical average time for providing a public service is approximately 10 minutes, which is 20.83 days for servicing 1000 insurers (10 minutes × 1000 insurers / 8 hours / 60 minutes). This means that the "Specialist" is behind the normative working hours of the service "Acceptance of 4FSS calculation" for 4.58 days. The solution to this problem is simple: employee should either stay at work longer hours, or work on weekends, or improve skills and reduce the time for the given operation.

For the category "Leading Specialist" (work experience from 1 to 5 years), the average time for providing this public service is approximately 7 minutes. Using the data given above, we calculate that the time for which this specialist is 14.58 days (7 minutes × 1000 insurers / 8 hours / 60 minutes). It can be seen from the calculation that the "Leading Specialist" manages to render the public service "Acceptance of 4FSS calculation" for the normatively allotted time (16.25 days), with a reserve of 1.67 days.

For the category of "Chief Specialist" (work experience of 5 years and above), the average time for providing this public service is approximately 5 minutes. The working time for this operation is 10.42 days (5 minutes × 1000 insurers / 8 hours / 60 minutes), which is 5.83 days less than the standard.

From these calculations we see that the average time spent by all categories of specialists of the FSS branch for the provision of the state service "Acceptance of calculation of 4 FSS" per one insured is (5 minutes + 7 minutes + 10 minutes) / 3 = 7.33 minutes, e.g. corresponds to the previously calculated average time for the provision of a public service per insurer (7.8 minutes).

Different periods of service of the insured by different categories of specialists lead to a mismatch between the loads between them, which affects the effectiveness of the provision of services. This is especially evident in case of influence of external or internal factors. For example, in the absence of one of the specialists, the average time will change (increase), which will lead to the formation of a queue, which means a change in the quality of the provision of public services. Note that the existing approach to managing the delivery of public services does not consider the temporary features of the business process by specialists of different categories and, accordingly, can not lead to the effective formation and adoption of managerial decisions in the social insurance system. This circumstance requires considering the time characteristics of the business process (monitoring) [15] to account for management activities.

### 3. Description of the monitoring methodology

Any business process can be defined as a logically interrelated sequence of functions, the results of which lead to the creation of a product or service. To obtain the result, appropriate information and resource support is needed. Components of the business process can be evaluated on a quantitative level, which allows you to build a numerical model of the process of creating products or providing services. The business process model consists of the following parts:

1) a set of functions;

2) the sequence of execution of each function;

3) the possibility of control and management in the performance of each function;

4) performers and responsible personnel for each function;

5) information and resource support.

For the state institution, the functions and their time limits are regulated by laws and regulations of the government of the Russian Federation. Financial and resource components are determined by the state and are considered unchanged in the task of managing the institution. Performers (specialists) of functions of business processes have different experience, qualifications and motivation. All this determines the need for their constant certification for self-improvement and to improve the quality of service delivery.

The methodology for organizing the process of preparing and conducting monitoring based on business processes includes the following steps:

1) the preparatory stage;

2) the stage of data collection;

3) the stage of processing, data analysis;

4) the formation of a report.

The preparatory stage is the formation of groups of employees who meet certain goals. For example, it includes assessing the effectiveness of their professional activities, which is important for awarding, raising or lowering the position, etc. The difficulty of solving this problem is that each employee has an established procedure of the order and time frame for the process of providing the service to the client. At present, temporary processes of rendering services are not evaluated in any way in a certification (administrative) survey.

The criteria for dividing specialists into categories can be as follows:

1) the amount of work performed for a certain period of time;

2) responsibility in the performance of work (reprimands, delays, etc.);

3) willingness to work outside the working day;

4) advanced training;

5) contribution to public works of the institution (sports and social events, etc.).

The first criterion is quantitative and allows for an accurate estimate. The remaining criteria are qualitative, but they can lead to a quantitative assessment (an example is the rating system).

Suppose that as a result of the expert evaluation, the following indicators were obtained:

$$Ps(k) = \sum_{e=1}^{E} \sum_{v=1}^{V} P(e,v,k), \qquad (1)$$

where $P(e, v, k)$ — the expert evaluations submitted by the $e$-th expert ($e = 1, ..., E$) on the $v$-th indicator ($k = 1, ..., V$) for the $k$-th specialist ($k = 1, ..., K$).

The average time for the provision of the same service in a public institution can be estimated from the expression:

$$T(k,t) = \frac{1}{MN} \cdot \sum_{i=1}^{M} \sum_{j=1}^{N} t(i, j, k), \qquad (2)$$

where $t(i, j, k)$ — the time when the state service is provided by the $k$-th specialist, for $i$-th customer ($i = 1, ..., M$), while $j$ functions ($j = 1, ..., N$) are required to provide the service.

Under the influence of external and internal factors on the state institution, deviations from the regulatory values arise, which can be represented by the expression:

$$\Delta T(k, t) = T(k, t) - Tr, \qquad (3)$$

where $T(k)$ — the real time of service delivery;

$Tr$ — regulatory time determined by law (no more than 15 minutes).

For each specialist in the period of his/her work $Tw$ for a certain period of time, the deviations (3) can be fixed as an average value:

$$Ts(k) = \frac{1}{Tw} \cdot \sum_{t=1}^{Tw} \Delta T(k,t), \qquad (4)$$

where $\Delta T(k,t)$ — the deviation of the time of provision of the governmental service by the $k$-th specialist at the $t$-th time moment of the period $Tw$ ($t = 1, ..., Tw$).

Then the integral assessment of the specialist's activity obtained during the monitoring process or when assessing the suitability of the candidate for a vacant position in the process of testing him/her, can be represented by an expression that takes into account the individual contribution (weight factors $\alpha$, $\beta$, $\gamma$) of each component:

$$C(k) = \alpha \cdot Ps(k) + \beta \cdot F(Ts(k)) + \gamma \cdot Ws(k), \qquad (5)$$

where $Ps(k)$ — the results of the assessment of the activity of the $k$-th specialist (according to the five-point system) by experts;

$Ts(k)$ — the total deviation from the standard time during the working day for the $k$-th specialist;

$Ws(k)$ — assessment of the $k$-th specialist's activity (on a five-point system), obtained on customer feedback;

$(\alpha, \beta, \gamma)$ — weighting factors $(\alpha + \beta + \gamma = 1)$;

$F$ — a function that takes timing data into a five-point rating system.

The estimation of the weight factors $(\alpha, \beta, \gamma)$ in (5) is a nontrivial problem and is not discussed in this paper. It can be assumed that the most significant contribution to the value of employee performance is given by the factor at $Ts$, since it is calculated on a regular basis (for example, $\beta = 0.5$). The second factor is the multiplier for $Ps$ $(\alpha = 0.3)$, since the expert commissions consider the activity of employees quite rarely, not more often than once a year. Then the weighting factor for $Ws$ $\gamma = 0.2$. It should be noted that the $Ws$ assessment is largely subjective, since the opinion of not all clients is included, the psychological state, etc., may be affected. However, this assessment is determined by the state regulations as significant.

For the formation of a score for each employee (integral rating) for a certain period (for example, a month), one can use the $C(k)$ estimator system, based on expression (5). Then, with a monthly evaluation, at the end of each year there will be at least ten integral ratings that will give an unambiguous assessment of each employee's work (*Table 1*).

*Table 1.*
**Evaluation of employee performance**

| Attestation appraisal | Integral rating |
|---|---|
| "Excellent" | 45 – 50 |
| "Good" | 40 – 45 |
| "Satisfactorily" | 35 – 40 |
| "Unsatisfactory" | < 35 |

## Conclusion

A specific feature of the activity of a state institution is the continuous nature of the process of rendering services to clients and preparing report documents. Constant changes in the regulations of work carried out by superior organizations lead to the fact that all employees need to constantly improve their activities and adjust plans. In addition, the governmental institution lives under certain regulations, within which it is necessary to carry out both regular work and temporary assignments. The form of evaluation of each employee's activity is periodic certification.

This article suggests a technique for monitoring the activities of employees in the process of providing services which are based on business processes. The methodology includes two components — qualitative and quantitative. This allows us to identify the specifics of the work performed by each specialist during a certain time period (including shortcomings in the organization of work), as well as assess the success of employees holding certain positions. ∎

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