Development and deployment of automated electronic document management system in municipal units

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Abstract. The paper analyzes the efficiency of development and deployment of automated electronic document management system in municipal units. Even considering the pessimistic forecast, the payback period of automated electronic document management system will not even exceed half a year. The introduction of automated electronic document management system will increase the reliability of the entire infrastructure within municipal administration.

1. Introduction

In market economy, the use of information technologies in local self-governing bodies directly connected with handling and analysis of a variety of information is particularly relevant. The local self-governing bodies within municipal units is the closest level of authority to the population, which solves issues of its basic survival needs. Therefore, the positive evaluation of the state by its citizens depends on the efficiency of local self-governing bodies. To get such positive feedback, the authorities shall ensure more comfortable conditions for the population by providing sufficient public and municipal services. Information technologies are the most suitable to solve both tasks in municipal units. They help to shift the relations of authorities and the population to electronic space where everyone can freely interact with relevant structures. Besides, information technologies foster solutions increasing the efficiency of authorities.

Authorities in municipal units understand the need to create their electronic representative structures, but this requires certain financial resources, which are not quite sufficient within local self-governing bodies compared to federal authorities.

If information technologies are implemented correctly, the municipal units have an opportunity to store and analyze large volumes of information, to reveal regularities and to increase the efficiency of municipal management structures. As a result, this reduces the decision-making period and increases the quality of management and life of the population.

Despite all positive aspects of information technologies, there are some problems, which slow down the development of information technology within local self-governing bodies. Inter alia, such problems include low financial resources, lack of uniform approach to the use of information resources, insufficient and excessive openness of information. Besides, poor development and practical application of information technologies are caused by the low level of information and computer knowledge of the population, as well as public and municipal officials. Hence, it is necessary to develop a project that would introduce automated information processing system to improve the activity of municipal units thus increasing the level of analytical work of corresponding experts and employees.
2. Materials and methods
It shall be noted that the development of municipal management based on active implementation of information technology is not sufficiently studied from the general theoretical perspective. This problem requires an integrated approach and cross-disciplinary study. Besides, except for practical issues, it deals with a variety of others as well (e.g. use of mathematical models and modern information resources), including sociocultural issues, issues of labor discipline, professional and status position of public officials, issues of state information security.

The methodological and theoretical basis of the study covers methodological approaches, conceptual provisions of information support of regional and municipal government described by S.V. Koptyakova [1; 5], D.R. Belousov [2], F.F. Ishkineev [3], I.I. Ismagilova [4], E.I. Kadochnikova [6], V.I. Klenina [7], T.P. Rakhlis [8], S.A. Revyakina [9].

The study was conducted using the dialectic methods of analysis; principles of system approaches, methods of economic and statistical analysis.

Statistical information on Magnitogorsk City Administration served the empirical information of the study.

The working hypothesis of the study is based on the fact that the use of information and communication technologies serves a key factor to improve the municipal management system.

3. The project on the introduction of automated electronic document management system in municipal units
The project of improving the document flow of municipal units represents the list of organizational, administrative and economic measures.

The purpose of the project is to create such document flow within a municipal unit, which would ensure efficient management of the organization, scheduling, processing and control of documents and information.

Tasks of the project:
- to create conditions for the development of electronic document management system;
- to increase effectiveness and efficiency of document flow within a municipal unit;
- to increase the volume of capital investments into the electronic document management system;
- to create a qualitative electronic document management system of a municipal unit.

The priority of the project is the improvement of electronic document management of a municipal unit, which acts as a source of operational information for managerial decisions.

The system of automation of document flow for a municipal unit gives a variety of opportunities, including the following:
- allows each expert to control only those objects, which he/she is dealing with;
- provides various documentation in the electronic form starting from technical to the maps of streets and houses;
- simplifies filing of all objects;
- allows filing of contractors according to their specialization thus simplifying the distribution of works between them;
- facilitates work planning at various objects;
- allows receiving different types of reports, keep complaint books, accounting of requests from the population, planned and unplanned works.

The automated electronic document management system includes the following functions:
- registration of incoming, outgoing and internal documents;
- centralized accounting and control of documents;
- information and reference support;
The automated document flow provides for more productive work of municipal units. Fast acquisition of paper and electronic samples of documents via scanning, recognition and printing facilitates the transition from paper to electronic format and vice versa. This ensures the transition from paper to electronic format thus utilizing computer advantages.

In our country the market of document management systems is presented by Russian software solutions based on foreign applications and proprietary software, as well as by several foreign brands. Domestic software better considers the specifics of the Russian document flow than the foreign analogs, and this is not about patriotism here, but about slightly other design principles of the western document flow.

Let us consider the opportunities to solve the existing problems of a company document flow after the introduction and subsequent use of such system.

The analysis of key functions of document flow systems available on the Russian market made it possible to rank electronic document management systems (EDMS) and to compile the EDMS integrated ranking (Table 1).

| System                                      | Final score |
|---------------------------------------------|-------------|
| EVFRAT Document Flow, Cognitive Technologies| 82          |
| OfficeMedia, Intertrast                     | 81          |
| ESKADO, Interprocom LAN                     | 81          |
| DELO, Eletronic Office Systems              | 79          |
| Zolushka Electronic office, STC IRM         | 78          |
| 1С: Archive, 1С                             | 77          |
| Optima Workflow, Optima                     | 73          |
| BOSS-Referent, IT                           | 73          |
| Effect Office, Garant International         | 72          |
| LanDocs, Lanit                              | 67          |
| PayDox, Interface                           | 62          |
| GranDok, Granit Center                      | 57          |

From technological and absolute perspective, the EVFRAT Document Flow of Cognitive Technologies became the leader of the ranking. The system is eminently suitable for large organizations and small and medium businesses. Besides its functionality, it also takes the leading positions in terms of its price and quality.

The introduction of suggested recommendations on the improvement of information systems in a municipal unit (on the example of Magnitogorsk City Administration) will be carried out in several stages.

The first stage requires the development of program documents, in particular regulations on the need to introduce the automated workplace, as well as provisions on the system of staff professional development and training (retraining). These documents define the corporate procedure on program implementation and staff training, functions of each user in the system of information support, their interaction with other services.

The second stage requires the staffing position to work on the unit and maintain this program, a separate work table, consultation with heads of services and the head of the municipal unit, equipment of departments with necessary office facilities and accessories (to be taken from a warehouse).

At the third stage on the basis of the standard delivery contract an employee of the department develops and signs the contract with LLC Ait-soft (Yaroslavl) for the installation of the EVFRAT Document Flow complex in the municipal unit alongside with pattern-by-pattern program of complex introduction, as well as staff professional development and training to work in this program.

At final stages, the staff of LLC Ait-soft together with the representatives of the municipal unit
develop the schedule of staff training and install the program.

The introduction of automated electronic document management system allows reducing labor costs for record keeping (Table 2).

**Table 2. Standard labor input of document flow procedures in a municipal unit**

| Operations                                      | Labor costs, h/month | Quantity of documentation | Total costs, h/month |
|------------------------------------------------|----------------------|----------------------------|----------------------|
| Registration of incoming, outgoing and internal documents | 0.5                  | 2145                       | 1072.5               |
| Centralized accounting and control of documents   | 1.2                  | 2145                       | 2574                 |
| Information and reference support                | 0.8                  | 2145                       | 1716                 |
| Compiling of work reports                        | 0.2                  | 2145                       | 429                  |
| Total processing time                             | 2.7                  | 2145                       | 5791.5               |

The introduction of automated electronic document management system in the municipal unit makes it possible to reduce the labor input considerably and many operations will only cover a report concerning either indicator.

Table 3 shows the calculation of labor input of operations within an electronic document flow after the introduction of automated electronic document management system.

**Table 3. Labor input of document flow after the introduction of automated electronic document management system in a municipal unit**

| Operations                                      | Labor costs, h/month | Quantity of documentation | Total costs, h/month |
|------------------------------------------------|----------------------|----------------------------|----------------------|
| Registration of incoming, outgoing and internal documents | 0.1                  | 2145                       | 214.5                |
| Centralized accounting and control of documents   | 0.7                  | 2145                       | 1501.5               |
| Information and reference support                | 0.6                  | 2145                       | 1287                 |
| Compiling of work reports                        | 0.1                  | 2145                       | 214.5                |
| Total processing time                             | 1.5                  | 2145                       | 3217.5               |

Table 4 shows the calculation of cost efficiency indicators for labor input in a municipal unit.

**Table 4. Assessment of labor costs reduction in a municipal unit**

| Indicator                  | Labor costs, h/month | Accounting periods in a year | Total h/year |
|---------------------------|----------------------|------------------------------|--------------|
| Manual handling           | 5791.5               | 12                           | 69 498       |
| Automated processing      | 3217.5               | 12                           | 38 610       |
| Savings                   | 2574                 | -                            | 30888        |

Table 4 shows the absolute measure of labor cost reduction indicating that the automation of electronic document flow in a municipal unit will save 30 888 h/year.

Labor cost reduction coefficient = (5791.5 - 3217.5) / 5791.5 = 0.44.

The labor cost reduction coefficient 0.44 means that only 56% of time is required in case of automated electronic document flow in comparison with manual handling.

Cost reduction index = 5791.5 / 3217.5 = 1.8.

It means that the labor costs will be reduced by 1.8 times.

Table 5 shows the calculation of cost reduction.

**Table 5. Assessment of cost reduction**

| Indicator                  | Labor costs, h/month | Hours per year, h/year | Average earned rate, rub. | Total rub./year |
|---------------------------|----------------------|------------------------|---------------------------|-----------------|

| Indicator                  | Labor costs, h/month | Hours per year, h/year | Average earned rate, rub. | Total rub./year |
|---------------------------|----------------------|------------------------|---------------------------|-----------------|
Table 6. Efficiency indicators of the introduction of automated electronic document management system

| Item             | Costs                  | Absolute changes | Cost change factor | Cost change index |
|------------------|------------------------|------------------|--------------------|-------------------|
| Labor input      | 5791.5                 | 3217.5           | 2574               | 44.44             | 1.8               |
| Cost             | 2054360.88             | 1141311.6        | 913049.28          | 44.44             | 1.8               |

Table 6 shows the calculation of efficiency indicators regarding the introduction of automated electronic document management system in the municipal unit.

Table 7 shows the cost of implemented software.

| Input factors        | Price, rub. | Quantity, pcs. | Total, rub. |
|----------------------|-------------|----------------|-------------|
| Klient software      | 14 700      | 18             | 264 600     |
| Server software      | 10 000      | 1              | 10 000      |
| Startup-setup operations | 5 000   | 1              | 5 000       |
| Tptal                |             |                | 279 600     |

Thus, the introduction of automated electronic document management system in the municipal unit (on the example of Magnitogorsk City Administration) will cost 279 600 rub, while the economic benefit will make – 913049.28 rub. The payback period of the project will make 3.5 months.

4. Conclusions

Obviously, the issue of automation of document flow in municipal units is individually solved for each enterprise. There are many negative aspects related to the integration of new technologies, staff training, re-equipment, motivation of management to use electronic document management systems, which justifies the multi-sided problem of automation and a possibility of further study of this matter.

The introduction of automated electronic document management system in the municipal unit (on the example of Magnitogorsk City Administration) will cost 279 600 rub, while the economic benefit will make – 913049.28 rub. The payback period of the project will make 3.5 months.

Despite minor indicators of cost efficiency, the real effect of the introduction is much higher since the electronic document management system will increase the reliability of the entire infrastructure within the municipal unit.

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