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INFORMATION SYSTEMS IN THE ORGANIZATION OF BUSINESS PROCESSESS OF FUNERAL COMPANIES: FEATURES OF EFFICIENCY ASSESSMENT

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Abstract. Currently, information technologies are necessary for effective activities in any area of society, including state and municipal government. Automation and digitalization of the state activity processes are an important step in the development of a modern government. The purpose of this research is to study the possibilities of workflow and management automation processes, and distinguish peculiarities of efficiency assessment at funeral companies taking into consideration current trends in business processes at municipal organizations. In the course of the research, the authors identified promising areas for automation, analyzed prerequisites for funeral and ritual processes automation, and identified problems requiring IT support. As a result, a comprehensive assessment of efficiency of existing IT solutions for workflow and management processes in funeral and ritual activities was carried out based on the "AS IS" model.

Keywords: information systems, funeral companies, "TO BE" model, "AS IS" model, document management, economic efficiency

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ОСОБЕННОСТИ ОЦЕНКИ ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ИНФОРМАЦИОННЫХ СИСТЕМ В ОРГАНИЗАЦИИ БИЗНЕС-ПРОЦЕССОВ РИТУАЛЬНЫХ КОМПАНИЙ

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Аннотация. В настоящее время информационные технологии необходимы для эффективной деятельности в любой сфере общества, в том числе и в государственном и муниципальном управлении. Автоматизация и цифровизация процессов государственной деятельности являются важным шагом в развитии современного государства. Целью данного исследования является изучение возможностей автоматизации процессов документооборота и управления, а также выявление особенностей оценки эффективности на предприятиях похоронной отрасли с учетом современных тенденций развития бизнес-процессов в муниципальных организациях. В ходе исследования авторы определили перспективные направления автоматизации, проанализировали предпосылки для автоматизации похоронных и ритуальных процессов, выявили проблемы, требующие IT-поддержки. В результате, на основе модели "AS IS" была проведена комплексная оценка эффективности существующих IT-решений для автоматизации рабочих и управленческих процессов в похоронно-ритуальной деятельности.

Ключевые слова: информационные системы, ритуальные компании, модель "TO BE", модель "AS IS", управление документооборотом, экономическая эффективность

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Introduction

The presence and use of information technology are necessary for effective activities in any area of society, including state and municipal government. Nowadays, when technology is rapidly developing, automation is becoming essential for processes of most spheres, as it allows to reduce the time and cost of completing tasks, improve the quality of services provided, and increase the efficiency of employees. Automation and digitalization of the state activity processes are an important step in the development of a modern government (Biryukova and Rostova, 2020; Klimova, 2022; OpenAgent, nd.). Today many government organizations are actively implementing new technologies and systems that automate many processes and simplify work with citizens and their appeals. One of the main tasks of state activity automation is to improve the quality of services that are provided to citizens. With the use of modern technologies, it is possible to significantly speed up the process of providing services, reduce waiting time and the amount of paperwork. In addition, automating government processes can reduce the number of

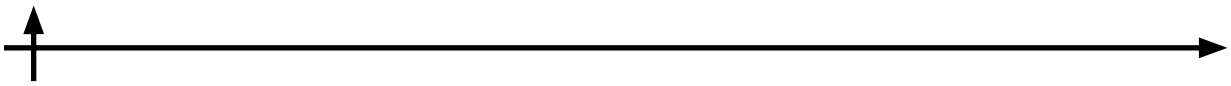
mistakes and simplify the task execution control.

However, despite the fact that the automation of public services has long since become a reality, many areas of public activity still need digitalization and automation. Modern realities require all spheres of activity (from government to commercial) quickly and effectively problem-solving, including the sphere of funeral and ritual activities. One of the key aspects of this area is a document management and management of processes related to the organization of funeral and ritual services.

The relevance of the research topic is explained by the low level of automation and digitalization of decease registering and funeral organization processes in the Russian Federation. Government services in the funeral area are presented in the format of in-person visits to organizations. In terms of the provision of funeral and ritual services, interaction with relatives of deceased people is usually carried out using e-mail, phone calls or in the format in-person visits to funeral organizations. Despite the presence of automation in some cemeteries, crematoria and funeral organizations, there are no information systems able to automate the full cycle of processes in the field of funeral and ritual activities – from appeal registering about the fact of the decease to burial. The market of such information systems and technologies in the area of funeral services in Russia is underdeveloped. Also, the legislative sphere of the Russian Federation plays an important role in the justification relevance of the research topic (Federal law N 149-FZ from 27.07.2006; Federal law N 443-FZ from 21.11.2022; Law of the Kirov Region from 10.11.2015 N 591-ZO). Legislatively, the funeral and ritual industry is regulated and systematized in law «About Burial and Funeral activities» of 1996 (Federal law N 91300-8 from 21.03.2022). That is, nowadays, the legislation does not provide the use of information technology within the processes of ritual and funeral activities. However, since 2022, discussions have been underway at the legislative level on a draft law that will make it possible to adapt the existing processes of funeral and ritual activities to the modern realities of digitalization of the public services provision.

Automation of workflow in the provision of public services is an important step towards improving the quality of service to the population and optimizing the work of government organizations. The automated workflow allows faster processing of citizen requests and appeals, reduces the number of errors, and simplifies the procedure for submitting and receiving documents (Golubeva, 2005). Automation also reduces the time spent on routine tasks, allowing government employees to focus on more important tasks. One of the main advantages of workflow automation is the ability to provide services online. This allows citizens to stay at home and save their time. In addition, automation reduces corruption risks, as all processes become transparent and controllable. Thus, automation of document flow in the provision of public services is a necessary step towards improving the quality of life for citizens and optimizing the work of government organizations. That is exactly why current assessment of economic efficiency of any enterprise should primarily focus on this factor.

In recent years, the Russian government has been actively working towards digitizing its operations and improving interdepartmental interaction (Gosuslugi, nd.a; Gosuslugi, nd.b; Gosuslugi Spb, nd.). To achieve this goal, the government has been investing in various IT-solutions and technologies that can enhance communication, optimize processes, and improve efficiency. One of the most significant IT-solutions that the Russian government has implemented is the Unified System of Interdepartmental Electronic Interaction (SMEV). The Unified System for Interdepartmental Electronic Interaction is a federal state information system created to provide the realization of interdepartmental information interaction between the information systems of SMEV participants to provide state and municipal services and perform state and municipal functions in electronic form (SMEV3, nd.). SMEV has two generations: SMEV 2



and SMEV 3. Since January 2015 based on the Decree of the Government No. 1222 «On the further development of a unified system of interdepartmental electronic interaction» the development of electronic services within SMEV 2 has been discontinued. Disabling existing services in SMEV 2 began in 2017. However, some services continue to work in SMEV 2. Participants in the SMEV (members of the SMEV) are federal executive authorities, regional executive authorities, state and municipal organizations, multifunctional centers, and other organizations.

Materials and Methods

This research invites the methods of extensive data collection and analysis, business process modelling as a tool to assess potential bottlenecks in assessment of economic efficiency of a funeral enterprise. Evaluation of project effectiveness is also represented in this paper. The obtained information was classified in accordance with relevant trends in document and workflow management at funeral enterprises via the implementation of up-to-date methods of assessment of business processes, together with general scientific methods: analysis and synthesis; comparison; classification.

Results and Discussion

Nowadays, there is no solution on the Russian software market that allows the complex automation of the funeral and ritual sphere processes. Citizens who are faced with the decease of relatives and someone else are forced to go through several organizations in order to get the necessary documents for organizing the burial, and then search the most suitable funeral organization based on budget and services. The activities of funeral and ritual organizations are also poorly automated, interaction with applicants and clients is carried out through communication with ritual agents (Bentley, 2010; Popov, 2016).

Automation of the internal processes of funeral organizations has also become necessary, although a number of funeral services are considered difficult to automate. But nowadays information technology is increasingly being implemented in those industries that were previously considered non-automated (Biryukova and Rostova, 2021; Farnieva and Kulaeva, 2020). The premises that the ritual activities should be automated become more and more obvious. Firstly, young people with good skills in information technologies are increasingly appearing in the funeral organizations' management. Secondly, the number of workplaces equipped with desktop computers or laptops is increasing in funeral organizations. Thirdly, funeral organizations' management is realizing that business process automation can increase service speed and customer satisfaction and, as a result, gain a competitive advantage over similar organizations. Such premises indicate that the level of readiness of funeral organizations for automation is increasing.

Process analysis is usually associated with identifying all the participants involved in existing processes. Identifying the participants involved in processes allows more accurate determination of each participant's goals and objectives, as well as identifying possible problems and bottlenecks in the processes (Kraichik and Naidyonysheva, 2016; Levina et al., 2017; Li and Chen, 2009). Overall, identifying participants and determining their roles in processes is an important step in describing processes, which ensures effective interaction between process participants.

Participants involved in the processes of a decease registering and organizing a funeral are presented in Table 1.

Table 1. Participants involved in the processes of a decease registering and organizing a funeral

№	Participant	Main objective within considered processes
1	Citizen	To register a decease To organize a funeral
2	Ambulance	To state the decease fact
3	Police	To examine the deceased body
4	Organization for transportation the deceased to the morgue	To transport the deceased to the morgue
№	Organization	Main objective within considered processes
5	Morgue	To conduct forensic examination To preparate the deceased for burial
6	Registry office / Multifunctional center for the providing the state and municipal services (MFC)	To register a decease
7	Cemetery / Columbarium administration	To provide a burial place / columbarium niche
8	Crematorium (in case of cremation)	To cremate
9	Funeral organization	To organize a funeral To provide ritual services

It should be noted that a citizen needs to apply both to state institutions and to commercial ones.

As part of the analysis of existing workflow and document management processes of funeral and ritual activities, a simplified «AS IS» scheme was created. The simplified «AS IS» scheme presented in Figure 1 shows the activities that are performed by citizen within the processes, and also displays a list of documents and organizations involved in the processes. The scheme can be used for initial introduction to the problem and the area, as well as for the initial analysis of existing processes and identification of problem areas that may require optimization or automation.

In order to get a bigger picture of existing issues it was important to generate a simplified «AS IS» scheme. Based on the assessment of the existing process of organizing a funeral, the following problems were identified:

– lack of automation of the process: only one document (the decease certificate) can be requested electronically, but anyway, to get it, the citizen will need to visit the organization);

– lack of integration between organizations involved in funeral and ritual processes: all organizations are not connected with each other in any way and nowadays they are in different information fields, also, organizations do not have one common supervising body that will control their activities;

– need to visit several instances to obtain the necessary certificates and documents by the citizen (often the problem is aggravated by the emotional state of the citizen): citizen needs to get at least 10 documents, most of which are issued in different organizations, as well as only in paper form;

– opacity of processes: in the open information space there is no detailed information about the process of decease registering and organizing a funeral in the form of a single source, in order to understand the process in detail, it is necessary to explore several sources;

– lack of a unified register of funeral organizations, as a result, the lack of an opportunity to compare services and the price range for them from different organizations;

– impact of the human factor on processes (for example, a physical document may be lost).

The simplified «AS IS» scheme is presented in Figure 1 below.

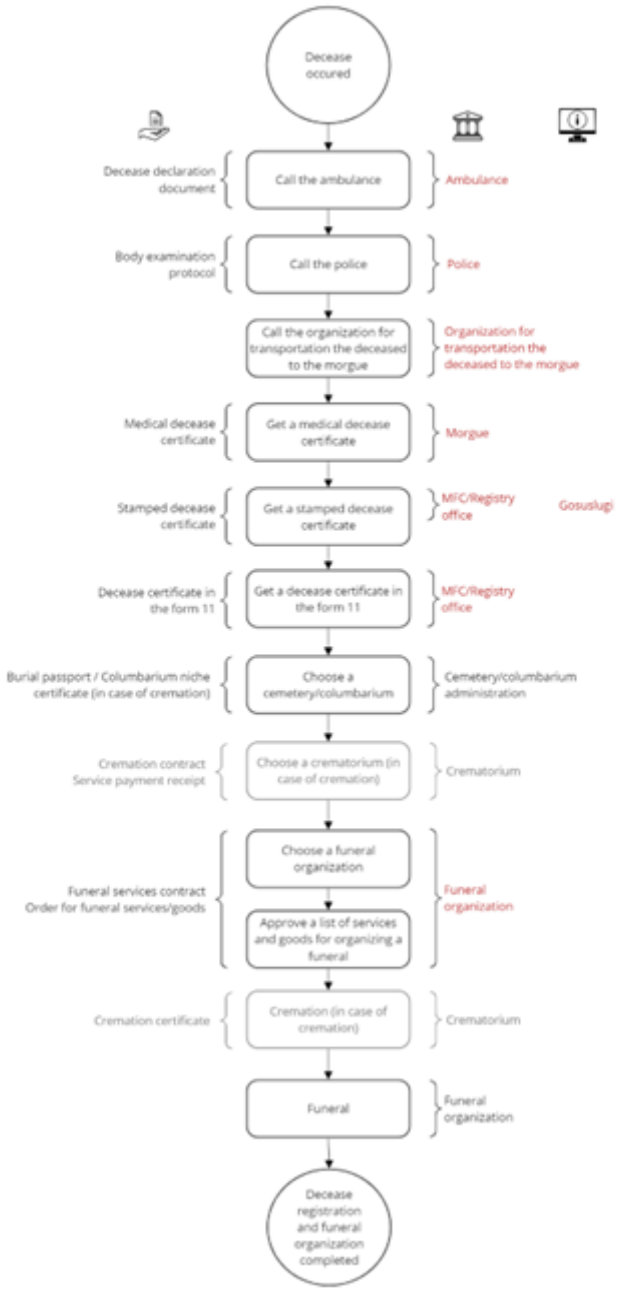


Fig. 1. Simplified «AS IS» scheme

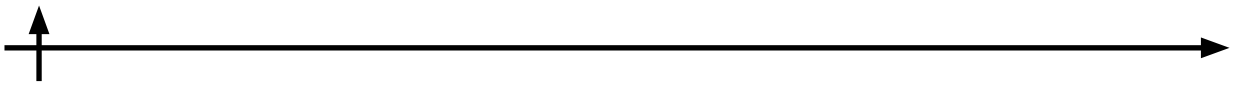
Based on the analysis of the register of Russian software, we can conclude that at the moment these are the information systems for digitalization processes in funeral and ritual activities (Federal information address system, nd.; Unified register of Russian computer programs, nd.):

– AeroGIS «Kladbishche» which is designed to conduct an inventory of cemeteries and keep records of burials;

– 1C:Enterprise 8. Ritual services management, which is designed to automate the activities of businesses that provide funeral services;

– GIS «Pamyat», which is designed to maintain electronic accounting in the field of burial and funeral services for municipal public institutions (GISPAM, nd.).

AeroGIS «Kladbishche» is a software designed for an cemeteries inventory and further ac-



counting of burials. The users of «AeroGIS Kladbishche» are state and municipal organizations working in the funeral and ritual area.

The system is designed for:

– building a system of modern electronic accounting and search for burial places;
– identification of burials;
– identification of empty places on the territory of the cemetery;
– identification of burials that exceed the standards of permissible fence sizes;
– improving the efficiency of municipal services provided to the population, generating documentation about the location of the grave;
– valuation of empty land and planning of cemeteries.

However, it is important to note that the system is provided free of charge, when ordering a set of services cemetery inventory. The system cannot be bought separately. The system is adapted for large-scale maps, has a built-in ruler, allows to maintain a database of burials.

1C: Ritual services management – industry solution, which is designed to automate management and operational accounting for businesses in the funeral industry: funeral organizations, cemeteries and other businesses that provide funeral services. «Ritual service's management» configuration is based on a typical configuration of «Management of our company» of software system «1C:Enterprise 8» with preservation of all the features and mechanisms of the standard solution.

1C: Ritual services management automates the following processes:

– receiving and accounting of orders from customers for ritual services;
– receiving orders for monuments and engraving work;
– receiving orders for the care of the burial places;
– production management;
– transport management;
– registration of burial places;
– record keeping, preparation and submission of individual entrepreneur reporting.

Geographic Information System «Pamyat» is software targeted at municipal institutions designed to maintain accounting in the field of funeral services. The software is included in the unified register of Russian programs for electronic computers and databases of the Ministry of Communications of the Russian Federation and can be freely purchased by municipal institutions in accordance with the Federal Law N44-FZ (Federal law N 44-FZ from 05.04.2013). There are two versions of the system – desktop and web version.

Due to the tightening of legislation, executive authorities, as government contracting authority, need to justify and calculate the price of a state order. One of the ways to calculate the maximum procurement price is the method of comparing market prices (or market analysis method), which involves establishing the maximum procurement cost based on information on market prices for identical goods, services or works planned for procurement. Information on market prices is based on commercial proposals received by contracting authority's request from the executing companies. Moreover, the executing company have to explain the source of the commercial proposal positions.

As an example, this research provides a commercial proposal from development company, which, together with other proposals, forms the basis for justifying the maximum procurement price based on the market analysis method. In order to calculate development costs, it is necessary to determine which human resources are involved in the project, calculate the cost per hour of work for each employee, and based on the data obtained, build a summary table that will display the cost of work for each stage.

The following human resources are involved in the Unified system of funeral and ritual ser-

vices creation project:

1. development team:
- 1 senior back-end developer;
- 2 middle back-end developers;
- 1 senior front-end developer;
- 2 middle front-end developers;
- 2 test engineers;
- 1 system administrator;

2. analyst team and project manager:
- 1 middle business analyst;
- 1 middle system analyst;
- 1 senior analyst;
- 1 project manager;

3. technical writing team:
- 1 senior technical writer;
- 1 middle technical writer.

All of the above employees are employees of the development company that is creating the Unified system of funeral and ritual services. The results of calculating the cost per hour for each employee are presented in Table 2.

Table 2. The cost per hour for each employee

Employee	Cost per hour, rub
Senior back-end developer	1640
Senior front-end developer	1518
Project manager	1336
Senior analyst	1215
Middle back-end developer	1154
Middle business analyst	850
Middle system analyst	789
Test engineer	668
Senior technical writer	668
System administrator	547
Middle technical writer	486

Department employees are also involved in the project, who are participating in the initiation of the project, formation of requirements, development of concept, technical specifications, and technical project, conducting preliminary complex tests of the system and system trial operation, as well as system acceptance tests. However, their work is not additionally paid, as it falls within their competence.

Based on data on human resources, cost per person-hour, time spent on the development and implementation, and the scope of work, it is possible to create a table with the cost of each project operation. Table 3 shows the cost for each stage of the project. The result of the calculations is the total cost of the development and implementation of the Unified system of funeral and ritual services.

Table 3. Costs of project stages

№	Stage name	Cost of the work of employees during the stage, rub
1	Project initiation	0
2	Formation of requirements	0
3	Concept development	0
4	Technical specification	0
5	Technical project	335 200
6	Software and documentation development	12 607 080
6.1	System software development	12 451 640
6.2	Development of documentation for the system	155 440
7	Commissioning	661 304
7.1	Preparation of the automation object for the commissioning of the system	75 320
7.3	Installation of cryptographic tools of the system	75 320
7.4	Staff training	80 160
7.5	Preliminary complex tests of the system	93 288
7.6	Preliminary autonomous tests of the system	93 288
7.7	System trial operation	0
7.8	System acceptance tests	93 288
TOTAL		13 603 584

Based on the calculations conducted, it can be concluded that the cost of developing and implementing of the Unified system of funeral and ritual services is 13 603 584 rubles.

In this project the cost of software is equal to the cost of the CryptoPro CSP 5.0 license, i.e., 200 000 rubles. There are no other software costs since the Unified system of funeral and ritual services is being developed from scratch by the development company using previous project experience. In government organizations (call centers, client centers) of the region, where the Unified system of funeral and ritual services will be implemented, all workstations of employees who will be using the system are equipped with necessary equipment (PCs and related components). It is planned that 70 employees will use the system. However, it is necessary to purchase and install servers for the system to function. The necessary equipment purchases are shown in Table 4.

Table 4. Equipment costs

Equipment type	Quantity, pcs.	Cost per piece, rub.	Cost, rub.
Server	2	459 000	918 000
Cable set	2	3000	6000
TOTAL			924 000

Thus, equipment costs are 924 000 rubles.

After calculating the development and implementation costs, as well as software and equipment costs, capital expenditures were calculated. The capital expenditures of the project are presented in Table 5. The data for the table creation were taken from Tables 3 and 4.

Table 5. Capital expenditures

Capital expenditures type	Cost, rub.
Development and implementation costs	13 603 584
CryptoPro CSP 5.0 license cost	200 000
Equipment costs	924 000
TOTAL	14 727 584

Based on the calculations, it can be concluded that the capital (investment) expenditures of the creating the Unified system of funeral and ritual services project are 14 727 584 rubles. After calculating the capital costs, operational costs were calculated. The calculations are presented in Table 12. It should be noted that the government organizations (call centers, client centers) of the region, where the Unified system of funeral and ritual services will be implemented, equipped with the 70 PCs (since the planned number of system users is 70 employees, 70 PCs are taken into account) and their components (computer mice, keyboards). There are also some general rules for depreciation calculation in government organizations:

– depreciation is calculated based on depreciation rates for fixed assets worth over 100 000 rubles;

– depreciation is not calculated for fixed assets worth less than 10 000 rubles;

– for fixed assets worth from 10 000 to 100 000 rubles, depreciation is the amount of 100% of the initial cost.

Table 6. Operational costs

№	Indicator	After implementation, rub./month	Note
1	System maintenance costs	417 700	System maintenance includes: – system health monitoring; – system backup; – consulting of IS users; – technical support.
2	Costs for maintenance of equipment (PCs, PC components, servers, and server components)	42 680	The government organizations (call centers, client centers) of the region, where the Unified system of funeral and ritual services will be implemented, equipped with the 70 PCs and PC components. Servers and server components were purchased for the system implementation. The costs per unit are as follows: – 524 rubles/month for a PC; – 2000 rubles/month for a server; – 500 rubles/month for server components; – 1000 rubles/month for PC components.
3	Depreciation expenses	79 714.25	As mentioned before, the government organizations (call centers, client centers) of the region, where the Unified system of funeral and ritual services will be implemented, equipped with the 70 PCs and PC components. The monthly depreciation expense for the PCs is 0 rubles (since each PC cost 41 000 rubles, government organizations apply 100% depreciation to fixed assets worth from 10 000 to 100 000 rubles when put it into operation). The monthly depreciation expense for the servers is 79 714.25 rubles (each server cost 459 000 rubles, and government organizations apply depreciation according to the calculated depreciation rates (33.33% of the initial cost) for fixed assets worth over 100 000 rubles). The depreciation expense for the components of PCs and servers was not calculated (the initial cost of a computer mouse and keyboard set is 1 750 rubles, and the components for the server are 3.000 rubles).
	TOTAL	540 094.25	

Based on Table 6, it can be concluded that the operational costs after implementing the Unified system of funeral and ritual services will be 540 094.25 rubles per month.

Conclusions

The implementation of information technologies in funeral and ritual activities will provide many opportunities for the development of this field. Digitalization in this area will provide a unified information environment for appeal about the decease fact processing, interaction between various organizations involved in funeral activities, as well as transparency and efficiency of the management and workflow processes when registering a decease and organizing a funeral. Also, due to the creation of the information system, a greater number of actions to be performed during the decease registering and organization of the funeral is IT-supported.

Nowadays, complex automation systems for funeral and ritual activities are not created and used in the almost regions of the Russian Federation, so it is necessary to create, develop, and improve digital methods to support decease registering and funeral organization in the regions. The solutions observed in this research prove to be highly economically efficient.

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