AUTOMATED MANAGEMENT SYSTEMS: PROBLEMS OF IMPLEMENTATION AND INTEGRATION

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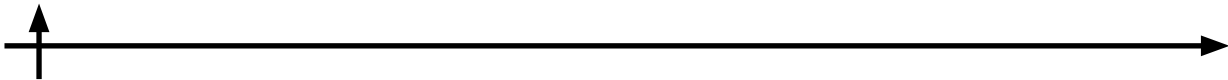
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Abstract. In the context of the digital transformation of the economy at various enterprises, the issue of effective and rational information management is acute. The modern day requirements indicate that for the stable functioning of even small companies, it is necessary to clearly control the work, keep records and manage the flow of information. The relevance of the development of automated control systems is determined by the need to introduce an electronic document management system at enterprises, caused by large volumes of work with documents, searching, approving, coordinating documents, saving time, ensuring information security and improving executive discipline for the controllability of technological processes. In the course of the study, issues related to the problems of introducing information systems in enterprises were considered. Integration problems are not limited to software, they cover the entire IT infrastructure of the enterprise, which should provide the ability to integrate not only software components, but also the business processes it serves without losing flexibility and scalability. As a result of the study, it was revealed that the integration of new information systems will help to obtain a number of advantages over competitors in the local market, as well as speed up the processing of requests on the company's website.

Keywords: information system, integration, implementation of IT systems, process management, information services

АВТОМАТИЗИРОВАННЫЕ СИСТЕМЫ УПРАВЛЕНИЯ: ПРОБЛЕМЫ ВНЕДРЕНИЯ И ИНТЕГРАЦИИ

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Аннотация. В условиях цифровой трансформации экономики на различных предприятиях остро встает вопрос эффективного и рационального управления информацией. Требования времени говорят о том, что для стабильного функционирования даже небольших компаний необходимо четко контролировать работу, вести отчеты и управлять потоками информации. Актуальность разработки автоматизированных систем управления определяется необходимостью внедрения системы электронного документооборота на предприятиях, вызванной большими объемами работы с документами, поиском, утверждением, согласованием документов, экономией времени, обеспечением информационной безопасности и повышением исполнительской дисциплины для контролируемости технологических процессов. В процессе исследования рассмотрены вопросы, связанные с проблемами внедрения информационных систем на предприятиях. Проблемы интеграции не ограничиваются только программным обеспечением, они охватывают всю ИТ - инфраструктуру предприятия, которая должна обеспечить возможность интеграции не только программным компонентам, но и обслуживаемым ею бизнес-процессам без потери гибкости и масштабируемости. В результате исследования выявлено, что интеграция новых информационных систем поможет получить ряд преимуществ перед конкурентами на локальном рынке, а также ускорить обработку запросов на сайте компании.

Ключевые слова: информационная система, интеграция, внедрение IT-систем, управление процессами, информационные сервисы

Introduction

Developing technologies are the main reason for the creation of new enterprises. When a business grows, information technologies can come to the rescue and make it easier, or vice versa, improve the operation of the enterprise. It is possible to create a symbiosis that will guarantee the correct operation and timely implementation of the company's activities. The purpose of this study is to identify the weaknesses of the company "Autoross" and features in the integration of information systems in order to reorganize the business processes of the enterprise. This has become necessary due to the growth of the company and its customers, who need to always provide retail services on time and correctly assess market trends. The integration of new information systems will help to gain a number of advantages over competitors in the local market, as well as speed up the processing of requests on the company's website. The advantages will contribute to further growth, but we must be prepared to increase the dependence of the enterprise on the IP that will be implemented. This leads to increased requirements from management to the quality of systems. In addition, the management also needs to take into account that the damage from possible IP failures may increase, since it will already be more significant if compared with the traditional management model of the company.

Fig. 1 reveals the main features of the introduction of the organization in the integration of informa-
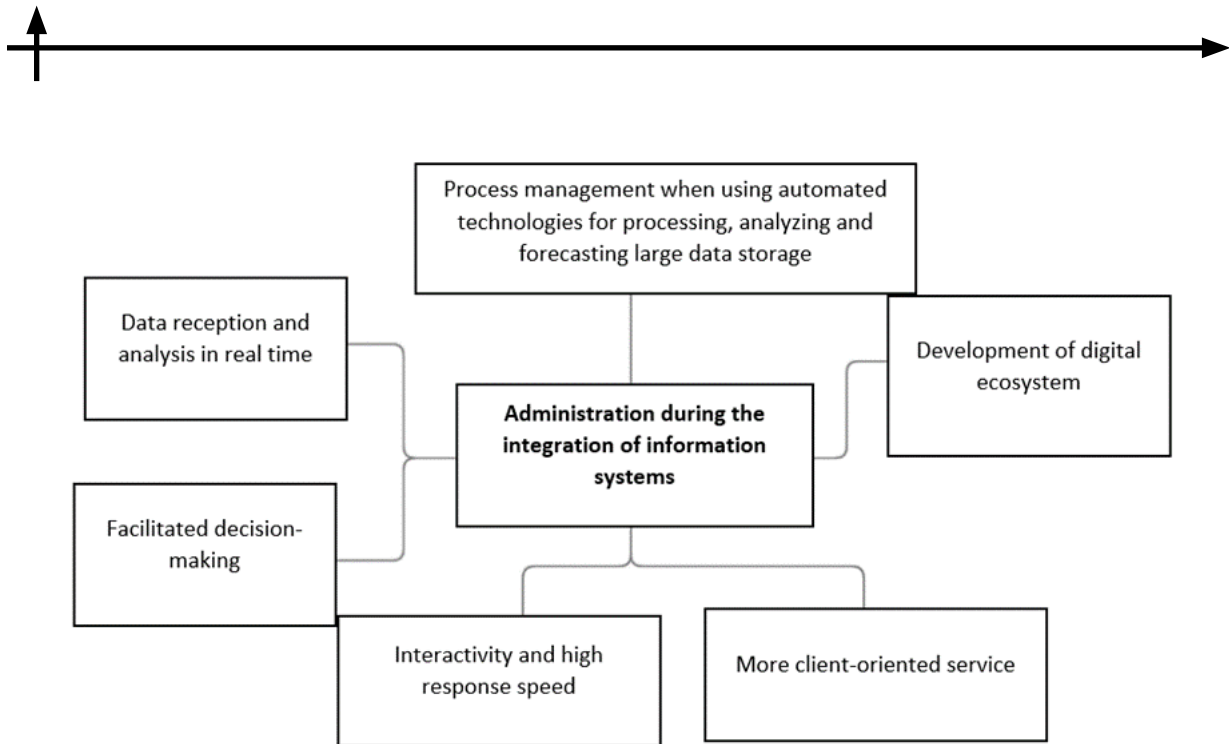
Fig. 1. Main features of IT-systems integration

tion systems.

Having studied the advantages and identified the needs for the integration of information systems, it is necessary to develop a model for the transformation of the enterprise and break it into simple elements. By observing them, the company will ensure a systematic transformation and development. Automated information system (AIS) is a set of software and hardware designed to automate activities related to the storage, transmission and processing of information. The aim of AIS is to increase productivity and labor efficiency, improve the quality of information products and services, improve service and service efficiency.

Materials and Methods

In this study, analytical methods were used, such as description, grouping of data, causal analysis, evaluation. The use of these methods allowed us to link disparate facts about the current situation in the development and evaluation of the success of business models of service companies in modern economic conditions. The methodological base of the study contains theoretical provisions of public sector economics and management, data from official sources of state authorities and includes methods of critical analysis, theoretical modeling and formalization.

Results and Discussion

The introduction of AIS into the subject area (store) will have a positive impact on the efficiency of its work: it will simplify the accounting and control of goods. But still, the AU will not be without drawbacks: energy intensity and dependence on it.

Stages of AIS development:

1. Analysis - determining what the system should do; In this case, the system is designed to monitor and process various parameters involved in the operation of the store;

2. Design - development of the structure of the future system;

3. Implementation - the implementation of the project, the creation of functional components and individual subsystems, the connection of subsystems into a single whole;

4. Testing - checking the functional and parametric compliance of the system with the indicators
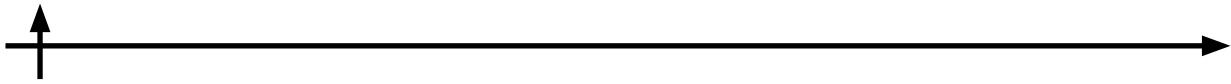
determined at the analysis stage;

5. Implementation - installation and commissioning of the system;

6. Support - ensuring the regular operation of the system at the enterprise (shop).

Description of the subject area

A store is a specially equipped stationary building (part of it) designed to sell goods and provide services to customers and provided with retail, utility, administrative and household premises, as well as premises for receiving, storing goods and preparing them for sale; The main operation is the sale and accounting of goods. The product is used as the source data. The result is a sold product. Before the start of work on the technological preparation of the sale, the control of the goods that are necessary for sale is carried out. This procedure uses a large amount of manual labor. In this regard, it was decided to automate this process. Description of the process "as is now (AS IS)" Accounting is conducted by a financially responsible person. the goods being sold are not carried in cards, they reflect the number of goods in natural units. Records are made on the basis of documents on receipt or disposal of goods. After each entry, a new balance is entered in the card. At the end of each month, the statement is transferred to the warehouse for putting down the remnants of the goods, in quantitative terms at the end of the month from the inventory records cards for each item number. After that, it is transferred to the accounting department.

Disadvantages:

– Slow interaction inside the store • Loss of registration cards

– A large amount of information processed "manually"

Description of the process "how it should be (TO BE)"

Accounting is conducted by a financially responsible person. Finished products are entered into the database, they reflect the movement of goods ready for sale in natural units. Records are made on the basis of a database directly involved in the work of this department, on the receipt or disposal of goods.

Dignities:

– Reduces document flow

– Visual accounting and control of goods • Formation of accounting documentation

Disadvantages:

– Electrical system

– Risk of system failure

– Threat of system security from hacking or virus attack

In order to effectively achieve the goals of AIS, the following integration problems need to be solved during development:

1. The problem of integrated management improvement is to exclude the disunity of solving individual tasks, which leads to the fact that the issues of optimizing solutions for the system as a whole fall out of consideration.

2. The problem of decomposition of the control object is that when the automation object is divided into parts, the automation efficiency as a whole and each part separately must be carried out in compliance with their integration.

3. The problem of inter-level and intra-level integration is to establish rational ways of organizing the relationship and interaction of various levels of management, including automated control systems, CAD, OASU, etc.

4. The problem of compatibility lies in the development of internally compatible components of technical, software, information support of the IASU, externally compatible with automated systems of the upper (lower) levels of management.

5. The problem of adaptability is to ensure the ability to adapt to changing goals, organizational structure, forms and methods of management and other external and internal conditions. According to the requirements of GOST 24.104-85 [15], the adaptability of AIS should be sufficient to achieve the
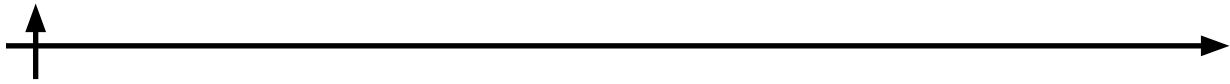
established goals of its functioning in a given range of changes in application conditions.

Solving these problems involves implementing the basic concepts of an integrated automated control system, which include software integration:

– phases of the product life cycle;

– levels of the hierarchy of the management system;

– methods of aggregation of algorithms of the same type of tasks, concentration of information resources in order to effectively use the capabilities of an automated system (Fig. 2).

| Name	Entity	Scope of application
Integration by phases of the life cycle	The subsystems – components of the IASU are allocated, providing management of individual phases of the life cycle (research, development, pre-production, delivery, operation, decommissioning); their compatibility and interaction are ensured in order to obtain maximum effect.	Production systems focused on mass and serial production with long-term use in various fields of activity
Integration by hierarchy levels of the management system	A complex object is divided into several simpler ones, subordinated to a superior by the corresponding control system. Coordination and management is carried out from the top down, accounting for the state from the bottom up.	Complex production systems, which include sections, workshops, productions, enterprises, associations, industries
Integration according to the frequency of solving complex tasks	The decomposition is based on the phases and periodicity of the data processing process in order to ensure maximum data processing.	Complex data processing systems as part of IASU
Integration by methods of aggregation of algorithms for solving complex problems	Data sets are allocated, the processing of which is carried out in accordance with the same type of algorithms	Frequently rebuilt production systems with variable production structureпроцесса
Integration of components of the automated part of the control system	As a part of the automated part, depending on the automation functions, functional control subsystems (CCI, OUP, etc.)	Production systems with a high level of control automation

Fig. 2. Capabilities of automated system

The essence of an integrated automated information management system is that the system being created should ensure the interconnection of automated information management systems of various levels, on a single informational, organizational, mathematical basis. The multilevel and integrative nature of the information system stems from the very essence of the management system, its structural multilevel and information interconnectedness of management structures. Arefeyev and others distinguish between horizontal and vertical integration of automated control systems. They refer to the basic principles of AIS integration:

– hierarchical construction of the system with the allocation of levels;

– unity of a centralized data bank with a set of local information databases; • unity of the formation of initial information and its repeated use;

– integration of information on requests at all levels of the organizational structure.

To ensure the operability of integrated automated control systems, communication tools are used, which serve as the basis for creating a variety of network options for automated information management systems.

In IASU, internal communication between the objects of the control system is carried out, as a rule, using automated workstations (APMs). The relationship is also carried out with the external system. Accordingly, when designing a management information support system, mutual provision of information needs for management at all levels should be taken into account. That is, when designing an information
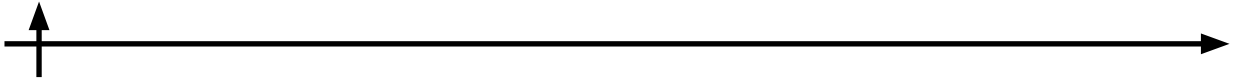
system at the enterprise level, the needs for information support of the highest levels of management should be taken into account, and, conversely, when designing higher-level management systems, the information needs of the lower levels of management should be taken into account.

When creating an IASU, a rational combination of various types of integration should be ensured:

— functional, ensuring the coordinated performance of production, technological, organizational and economic management functions of interrelated functions. Ensures the unity of goals and consistency of all components. Establishes for each component performance criteria, functioning models, data processing procedures, functional and information links between components;

— organizational, ensuring the rational distribution of rights and responsibilities of personnel, the establishment of a certain incentive mechanism, the creation of effective "human-machine" interaction in the process of production management.

— software, ensuring the implementation of an interconnected set of models, procedures and programs of coordinated production management;

— information, ensuring the interaction of information flows on the basis of a single information base and database management system, as well as on the basis of building compatible information collection and processing systems;

— technical, providing the creation of a complex of compatible computers, automation tools, computer networks, implementing integration in distributed information processing.

IASU should be created as a complex system. The complexity of the IASU should be achieved through the rational distribution of automated functions and tasks aimed at achieving the goals of the enterprise. Automation of solving complexes of interrelated tasks should be aimed at the main management functions, which include: scientific and technical development of the enterprise, production, improvement of product quality, formation and use of resources, improvement of the organization of production and management, social development of the team, etc.

The ultimate goals of the IASU functioning cannot be achieved with unchanged management procedures and algorithms, with changing organizational, economic and technological characteristics of management objects. To implement the necessary changes in the
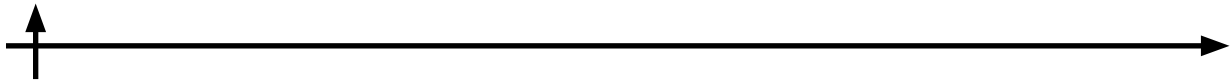
process of functioning of the IASU, the presence of the adaptability property. GOST 34.003-90 [18] adaptability defines how the ability of a system to change in order to maintain its operational performance in specified aisles when the external environment changes. The adaptive software of the IASU should include programs configured to change the values of the parameters of the functions performed and the conditions for solving complex tasks. The adaptation of software tools is provided by the use of high-level programming languages, application software packages and software design automation tools developed in accordance with the principles of structural programming.

Adaptive information support of the IASU should be based on unified databases, unified documentation systems, classification and coding systems, taking into account interaction with systems of hierarchy levels. Adaptive organizational support should be based on the principles of operational redistribution of staff functions, the use of organizational management procedures with overlapping functional responsibilities.

To ensure the operability of integrated automated control systems, communication tools are used, which serve as the basis for creating a variety of network options for automated information management systems.

Conclusions

The goal of automated problem solving is to eliminate the shortcomings that exist in the company, so it can be divided into two groups of sub-goals: achieving improvements in a number of economic indicators (increasing the number of clients served, reducing the number of personnel); improving the values of information processing quality indicators (increasing the degree of reliability of information process-

ing, the degree of its security, increasing the degree of automation of obtaining primary information).

This project considers the development of a new reporting form of sales statistics for the sale of goods, the development of an information and logical data model that provides an accounting, operational and quantitative summary report on the sale of goods. Prerequisites for the introduction of an information and analytical system:

1. the complexity of using large amounts of information on paper;

2. low efficiency of managers and analysts;) problems in organizing joint work on information;) possible loss of information, unreliability of storage;) lack of continuity of expert activity;) a large number of routine operations.

The effectiveness of order service management largely depends on the ability to respond correctly to market changes and make optimal decisions on planning the shipment of goods, while getting rid of a decrease in employee productivity and, as a result, a decrease in the economic efficiency of production. With the introduction of an information and analytical system, risks such as the deliberate spoiling of valuable information and the provision of deliberately distorted data are reduced.

As a result, the lack of accurate information about the state of affairs in the company, the lack of reliable reporting, which leads to a false assessment of the company's activities by the management, and unreliable reporting can lead to significant fines from the regulatory authorities of the state. Thus, in the conditions of constant development of Autoross, when making organizational and managerial decisions, the automated sales management information system being developed with the possibility of solving the problem of sales analysis is relevant. Information support is a set of data, language means of describing data, software tools, methods of organizing processing and storing arrays.

The initial data are: regulatory documents containing the article, product name, quantity of goods, order amount for each item; data for calculating sales amounts for a certain period of time. The database is being created for further integrated use. What will the implementation of the system give: − improving the efficiency of the company's management; − more efficient work and optimal use of working time; − ensuring the stability of the information flow; − improving the efficiency of the use of labor resources and increasing the productivity of employees of the enterprise; − electronic form of storage; − prevention of leakage and damage of important confidential information of various types (financial, economic, service - for internal use and other types of valuable information) − high reliability of information storage.

Thus, it can be concluded that this set of tasks for the example of sales accounting has a significant economic essence. This is a reduction in the costs of the enterprise and an increase in economic indicators as a result of an increase in the productivity of employees, which leads to the preservation of competitiveness and an increase in the economic efficiency of the company's activities.
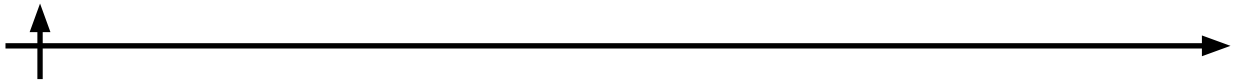
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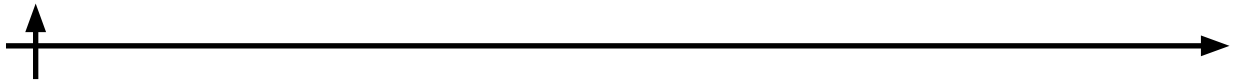
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