Strategy of introduction of information system in trade and logistics company

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Abstract. In the modern world, technologies and market requirements are constantly changing, and the introduction of modern information systems is necessary for the successful functioning of companies in the field of trade and logistics. These systems automate processes, simplify management and increase efficiency. The advantages of implementing information systems are discussed in this article, as well as the problems that companies may face in this process. The inconsistency of the company's hardware architecture and network with the requirements, as well as the lack of resources, including qualified personnel and finances, are the main problems. Incorrect choice of information system or resistance from employees can also cause problems. Taking into account all these factors and overcoming them is important for the successful implementation of information systems in the field of trade and logistics in order to get all the benefits from the new system.

1 Introduction

In the modern world, where new requirements and technologies arise every day, therefore, in the field of trade and logistics, the introduction of modern information systems becomes an integral part of the successful functioning of companies [1]. Such systems are a powerful tool that allows you to automate processes, simplify management and ensure a high level of efficiency [2-5].

The introduction of an information system is necessary, as it is due not only to the rapid development of the market, but also to competitive advantage and sustainability [5-10].

When implementing an information system in the field of trade and logistics, a number of problems arise that companies must face [2].

One of such problems is the discrepancy between the hardware architecture of the system and the computer network with the requirements and needs of the company. In many cases, companies already have an existing infrastructure that needs to be adapted to the new system [4].

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Another problem is that the company does not have the necessary resources to implement an information system [8]. This may include a lack of qualified employees, financial constraints, and technical limitations. Solving this problem requires careful planning and coordination of the company's resources.

The third problem may be the wrong choice of information system [5]. Companies should carefully research the market and choose the system that best meets their needs and requirements. The wrong choice of the system can lead to underutilization of its capabilities or incompatibility with existing company processes.

The introduction of an information system can also cause resistance from the company's employees [11-15]. Some people may be afraid of changes and switching to a new system, which may slow down the implementation process. This problem can be overcome by ensuring proper training of employees and their active involvement in the implementation process.

It is very important to take into account and overcome these problems when implementing information systems in the field of trade and logistics [12]. This will help companies successfully make the transition to the new system and get all the benefits that it can provide. The implementation of the system in the field of trade and logistics may also face a number of specific problems, including the complexity of integration, storage and processing of large amounts of data, synchronization of information, staff training, data security and interaction with suppliers and customers [9,11]. These are just some of the possible problems that can be encountered when implementing the system in the field of trade and logistics [13]. It is important to conduct a thorough analysis of requirements and risks, as well as take into account the specifics of the industry when planning and implementing a project to implement the system.

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2 Analysis and construction

2.1 Concept

The spiral life cycle concept is a software development model that combines prototyping and iterative development approaches. It was proposed by Barry Boehm in 1986. Figure 1 shows a spiral life cycle model.
The spiral life cycle consists of several iterations, each of which is associated with specific tasks and risks [12-14]. It is based on the idea of gradual improvement of the system, including its functionality and quality improvement.

The main steps of the spiral life cycle include:

- Defining the goals and objectives of the project. At this stage, the requirements are analysed and the main objectives of the project are determined [5].
- Risk assessment. Here, an analysis of possible risks is carried out and their impact on the project is assessed [2]. Based on this assessment, decisions are made about priorities and iteration planning.
- Prototype development. An initial prototype of the system is being created, which allows testing its functionality and compatibility with customer requirements [4].
- Assessment and analysis. The prototype is evaluated, its advantages and disadvantages are analysed in order to determine improvements and adjustments [11].
- Development and expansion of the system. At this stage, the system is being developed further and supplemented with new features and capabilities based on the results of previous iterations [8].
- Risk assessment and planning of the next iteration. The risks associated with the current state of the system are analysed, and the next iteration of development is planned [13].

The spiral life cycle allows you to flexibly develop and improve the system, applying an iterative approach and taking into account possible risks at each stage. It contributes to improving the quality of the product and meeting customer requirements [16-18].

### 2.2 Hardware architecture

A computer network is a device that exchanges data and uses shared resources. They use communication protocols to transmit information over physical or wireless technologies. Figure 2 shows the architecture of the hardware.

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**Fig. 1.** Spiral life cycle model.
Each department in the organization interacts with each other via the Internet. To do this, network cables are connected to a switch that is connected to the local server and the WAN. A local network consists of computers connected to a single server. Companies use Ethernet-based local area networks with speeds up to 1 Gbit/s. Computers, printers, routers and switches are connected to the local network.

All computers have access to the Internet and a local server. Routers and switches are used to manage traffic on a local network. Routers connect the local network to the global network, and switches connect computers on the local network [8]. Companies must have a dedicated communication channel, such as a fibre optic cable, which provides high speed and resistance to interference, in order to provide companies with access to the global market [10-15]. An application server, a web server, an email server, a file server and a DBMS server are connected to the global network of companies [18].

The web server provides access to the company's website via the Internet. It should be fast and accessible. The email server provides communication between the company's employees and customers. It must have high performance, security and use a secure communication protocol (SSL). The DBMS server stores and processes large amounts of information for users. It must be available on both the local and global network [18-23].

To ensure the security of the company's network, the following steps must be taken: installing a firewall to protect the local network, using a secure communication protocol (SSL), regularly updating software and conducting antivirus scans [1,8,16,18].

### 3 Implementation of the system

The implementation of systems can be carried out by different approaches depending on the specific situation and the requirements of the organization. Here are some of the most common approaches:

- **Step-by-step approach:** The system is implemented in stages, starting with one department or business process, then scaled to other parts of the organization. This approach allows you to implement changes more smoothly and take into account potential problems at an early stage [1].
Phase-in: The system is released in stages in certain phases, with each phase representing a completed stage of development and implementation. This approach is usually used for larger systems where large-scale changes are required [4].

Pilot implementation: the system is implemented in a limited volume, in one or several small groups of users. This approach allows you to check the performance of the system and identify potential problems before its implementation throughout the organization [13-17].

Rapid implementation: the system is implemented quickly and simultaneously at all levels of the organization. This approach can be applied when urgent implementation of the system is required to solve critical tasks [16-23].

It is important to take into account the specifics of the organization, its needs and the specifics of the project in order to choose the most appropriate option for implementing the system.

3.1 Step-by-step approach

A step-by-step approach is especially important for companies related to trade and logistics, where business processes can be complex and interconnected. Step-by-step implementation allows for thorough analysis and testing of the system at early stages, which helps to reduce risks and improve efficiency [5].

Figure 3 shows the processes and phases of phased implementation.

![Diagram of phased implementation process]

**Fig. 3.** Processes and phases of phased implementation.

The general plan for the implementation of the system may be as follows:

- Analysis and planning: the analysis of current business processes is carried out and the problems and needs of the company are determined. Based on this, an implementation plan is being developed with the definition of stages and deadlines.
- Training: Staff training, training and support are provided. The necessary systems and software are also selected and configured [16].
- Pilot launch: the system is implemented in a limited volume or in one department of the company [3]. Functionality testing and identification of problems are carried out here.
- Scaling: with a successful pilot launch, the system is extended to other departments or business processes of the company [5]. Integration with other systems takes place and the interaction of components is determined.
Testing and feedback: the system is tested in full, feedback from users and employees is collected. Based on this feedback, adjustments and improvements in the functionality of the system are carried out [8].

Completion and support: after the full implementation of the system, support and training of personnel is provided. The system is also monitored and problems are solved [13].

In addition to this plan, the following steps are also being carried out:

- Development and approval of the terms of reference, including business process analysis, system requirements and technology selection [20].
- Preparation of the organization's hardware for implementation, including the design of the server infrastructure and equipment configuration [24-26].
- Checking the compatibility of new software with existing systems [4].
- Preparation of the system for operation, including installation and configuration of the necessary software [24-27].
- Installing the system on the server and configuring interfaces and monitoring the stability of functioning [28].
- Connecting the system to databases, checking the connection and operability [4].
- Transfer of information from previous systems to the new system, checking the accuracy and completeness of the transfer [10].
- Installation of software on computers of all departments [4].
- Training of system users, conducting briefings and trainings [15].

This is a general plan for the implementation of the system, which can be adapted to the specific needs and requirements of the company.

3.2 Introduction to branches of company

Consider a situation when a company has branches located in other cities. In such a situation, effective implementation of the system can become a difficult task. When implementing the system in a company with branches in other cities, the following problems may arise:

- Geographical distance: branches in different cities may be located at a great distance from each other, which may lead to delays in communication and data exchange [2].
- Various business processes: each branch may have its own characteristics and unique business processes that require an individual approach when implementing the system [5].
- Different technology platforms: Different branches may use different technology platforms and software systems, which may make it difficult to integrate a new system [4].
- Cultural differences: branches in different cities may have different corporate culture, which may affect the adoption of a new system and require adaptation to the specifics of each branch [25].
- Need for training and support: The introduction of a new system may require training of employees in each branch, as well as providing support at different levels in order to resolve emerging problems and issues [16].
- Data security and confidentiality: Data exchange between branches requires a high level of security and confidentiality, especially when working with sensitive data [17].
- Outdated infrastructure: the company's branches may use outdated network infrastructure and equipment, which may require additional costs for upgrading and supporting the implementation of the system [8].

However, with the right approach and planning, these problems can be overcome.

To minimize these problems, it is recommended to conduct a thorough analysis and planning, take into account the specifics of each branch, provide a reliable network infrastructure for remote access and data exchange, as well as provide sufficient support and training for employees in each branch.
To implement the system in such a situation, the following approach can be used:

- Analysis and planning: to analyse the business processes and requirements of each branch, as well as to determine the goals and expectations from the implementation of the system. Create an implementation plan that defines the sequence and stages of work [5-15].
- Choosing a suitable system: based on the requirements and goals of the company, choose a suitable system that will meet the needs of each branch and ensure effective interaction between them [9].
- System preparation and configuration: Prepare and configure the system so that it meets the requirements of each branch. This may include integration with existing systems in each branch [4].
- Access assurance and network infrastructure: Configure the network infrastructure to provide remote access to the system from different branches. This may include setting up a virtual private network (VPN) or other means of remote access [28-30].
- Pilot launch at one branch: start the implementation of the system with a pilot launch at one of the company's branches. This will allow you to check the functionality of the system, identify possible problems and make the necessary adjustments [13-17].
- Scaling to other branches: after a successful pilot launch, the system can be expanded to other branches of the company. At the same time, it is necessary to ensure the integration of the system with existing systems in each branch and determine the interaction between the components [5,6].
- Training and support: Provide training for employees of each branch to work with the system and provide ongoing support to solve emerging problems or issues [16-18].
- Monitoring and improvement: to continuously monitor the operation of the system and collect feedback from users in order to make improvements to the functionality of the system and solve emerging problems [15-20].

It is important to take into account that the implementation of the system in this situation may cause difficulties in connection with remote work and data exchange. Therefore, it is recommended to use modern communication technologies and provide a reliable and secure network infrastructure [30].

4 Conclusion

The construction and implementation of an information system in the field of trade and logistics can be effectively implemented using a spiral life cycle model. This model offers a step-by-step and iterative development of the system, including requirements analysis, design, development, testing and implementation [30].

The phased implementation of the system allows companies to thoroughly study and understand the needs and requirements, as well as to plan and assess risks. In each iteration, the system can be tested and verified for compliance with the requirements, which allows timely identification and correction of errors and shortcomings [16].

One of the important components of a successful system implementation is the construction of a suitable hardware architecture. Such an architecture must meet the requirements of the system and the specifics of the company. It is necessary to take into account the scale and complexity of the system functions, its performance, scalability, reliability and security [28].

When building a hardware architecture, it is important to analyse risks and necessities in order to choose optimal solutions and technologies [4-6]. It is also necessary to take into account potential changes and extensions of the system in the future [5].

The joint implementation of the system and the construction of hardware architecture in the field of trade and logistics requires close cooperation of various project participants. The
development team, information technology specialists and company representatives should work together to achieve a successful result [8-14].

In general, the phased implementation of the system chosen according to the spiral life cycle model, taking into account the built hardware architecture, allows companies to ensure the successful implementation of the project and the effective functioning of the system in the field of trade and logistics [9].

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