The Role of the Warehousing Module in the Building of a Modern Enterprise Resource Planning System

Tihomir Stefanov [1], Silviya Varbanova [1], Milena Stefanova [1], Evsin Hasanov [1]

[1] *Department of Mathematics and Informatics, St. Cyril and St. Methodius University, Veliko Tarnovo, Bulgaria*

Abstract – **This article presents a developed and functioning Enterprise Resource Planning (ERP) for the warehouse logistics management, designed for the needs of small and medium-sized companies in Bulgaria. The current ERP system aims to satisfy the needs of a specific transport company – to track and manage the main activities. The main thesis of the present development is the leading role of software innovations in the use of data, their summation and distribution among the company's employees in real time. The design methodology of the developed system includes a study and thorough analysis of customer needs and requirements in order to fully cover the processes in the client company. At the same time, the system is flexible enough to adapt easily to future changes in the customer environment. The article presents the main characteristics of the implemented system, such as ease of use, speed, and intuitive design. As a result of its implementation, the management decision-making processes of both the middle and senior management teams of the company have been significantly supported and facilitated. The developed system has a market implementation in Bulgaria, and is in the process of searching for sales representatives, partners and customers in other countries.**

Keywords – **ERP, information systems, database, ERP modules.**

1. Introduction

In the last fifteen years, business organizations and enterprises have massively oriented themselves towards electronic resources and digitization. For any competitive company in the field of economy, electronic data management of materials, resources, services and employees is of great importance [1]. In the transition to digitization of the activities of small and medium-sized enterprises, their available costs and investments in the implementation of software products, the training of employees and employers, and the organization of work processes are important [2]. Nowadays, computer technology and software systems are used and implemented in the field of economy and goods market.

The important thing is not only the production of products in demand, but also the successful movement of goods and services from producers to their final clients. Reliable ERP systems are used to manage these activities. Today, using different modes of transport by sea, air or land, the products are delivered to different points around the world. An important factor is not only the implementation of transport activities, but also the storage of products, goods, or articles. Warehouses are an important necessity for storing them before they are finally delivered to the end user – a client or a company.

The main task of a business planning system, ERP (Enterprise Resource Planning) is related to improving the business operations of a company or an enterprise. In practice, ERP is associated with the management and utilization of resources, finance, production, supply, customers. Since the late 20th century, it has also evolved as customer relationship management systems (CRM) and warehouse management systems (WMS). An ERP system covers the core processes in an enterprise.

Along with ERP systems, other systems are emerging on the market to support the management of the processes related to customers (CRM), supply (SCM), and human resource management (HRMS).

Each ERP system contains a relational database with the company's resources available in all areas. ERP is built on a modular principle so that a specialized module serves each main activity of the company. ERP covers all business processes in an enterprise – the different modules must be optimally integrated so that management has the 'full picture' of the company at any given time.

Adhering to fundamental principles in business informatics ERP systems are meeting the demands and expectations of organisations. Information systems like ERP, are also technologically complicated. Their functionality in practice is extended continually by adding new modules and features grouped into components such as customer relationship management, human resources, accounting, finances, production, supply management, and order processing [3]. Fig. 1 shows a popular ERP system diagram with the relationships between the main modules included in it [4].
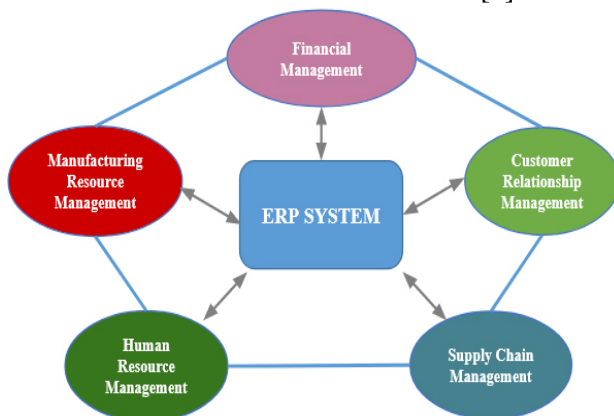

Figure 1. Basic structure of an ERP system

A scientific approach has been applied to prove the stated thesis on the importance of the warehouse module in modern ERP systems and this paper covers the following sections. In the second section, a review of recent publications by other authors on the same topic is presented. The third section presents the process of designing and developing an ERP system for a transport logistics company. In the next, fourth section, its structure and capabilities are described in detail. In the fifth section, some of the advantages of the developed ERP system are presented, as well as the results of the tests performed in a real working environment. The sixth section summarizes the most important conclusions drawn from this article.

2. Related Works

The term ERP (Enterprise Resource Planning) is used to denote the totality of the integration of business processes and a software system containing a centralized database and specialized modules developed for the purposes of a given company [5]. The mass implementation of ERP systems for managing the activities of companies in various areas of the economy such as the pharmaceutical industry [6], emergency aid [7], agriculture, transport and others is an indicator of their competitiveness.

The accompanying activities related to the delivery process, transport service and individual activities of the employees are also important. In order to provide fast and quality service, warehouse software is provided that meets the modern requirements for the implementation of the entire process.

ERP systems for the reliable management of activities for either small and large firms or enterprises play an important role in their presence in the commodity market [8].

The role of a reliable ERP system is associated with the planning and the identification of the information resources of a given company or organization, to limit the time in the optimization of data and activities, orders and delivery of goods, customer reports. The overall process of designing and building the database is important for the reliability of an ERP system. Nowadays, modern ERP systems are designed and organized through specialized modules aimed at the activity and management of the specific organization [9]. Regardless of the similar activities of the organizations in a certain field, it is necessary to customize the individual modules and their functionalities according to the specifics of the company for which they are intended [10].

Modern companies use software products supporting the work of employees, with the aim of easier and faster management of daily activities and the organization of work processes. With each implementation of a certain ERP system or module in companies, time and adaptation of employees are required for training and practice [11].

In the automation of customized business activities and processes to the needs of a given company, it is vital to use an information system that is reliable and well organized [12], [13]. Compared to companies that have not yet integrated ERP systems as an automation tool, this is also a sign of their more efficient management and control [14].

In recent years, an increasing number of specialized articles related to ERP systems have been published in academia.

On the basis of analyses, studies, surveys and summaries of results, scientific institutions together with companies are designing more and more reliable ERP systems for the benefit of small and medium-sized businesses for companies worldwide [15], [16].

This paper presents the design and implementation process of a robust and functional warehouse module management system with inventory, delivery, discharged and returned materials to or from vehicles.

3. Design and Development of an ERP System for a Transport Logistics Company

The individual steps in the design of the database, access to the system, specific functionalities for delivery and allocation of items in the warehouse, functionalities for listing materials by means of transport, as well as testing the system in a real environment are described in detail.

3.1. Purpose and Objectives

The main purpose of the ERP system is to satisfy the needs of a specific transport company – to track and manage its main activities.

During the design and implementation of the integrated management system, the following tasks have been completed:

- Designing a relational database and determining the relationships between the main objects in it;
- Assigning different roles to users;
- Access to the system with different user rights;

- Creation of a panel of the interface with the system for the administrator and for the user profile;
- Design and implementation of functionalities for processing the information on the items;
- Functionalities for material listing on vehicles.

3.2. Workflows and Database Structure

The following is a description of the main functions performed by the ERP system – from the administrator's or user's side. The structure of the unified database is presented, as well as relations between some of the main objects in it.

User registration in the system is carried out by a profile with administrator rights, i.e. an administrator takes care to register company employees as users with appropriate roles, e.g. manager, warehouse worker, driver, etc. Fig. 2 shows a *sequence diagram* for user registration.

When entering the user data and there is an existing email in the database, the system notifies about the discrepancy and recommends using another email.

In Fig. 3 fields and relations between main tables from the system database serving the management of employees and the possibility of their access as registered users are presented. When attempting to access the online system, a comparison is made with the data entered in dbo.AspNetUsers. After successful registration and data validity, a token is issued, which serves to authenticate and authorize users when using the software.
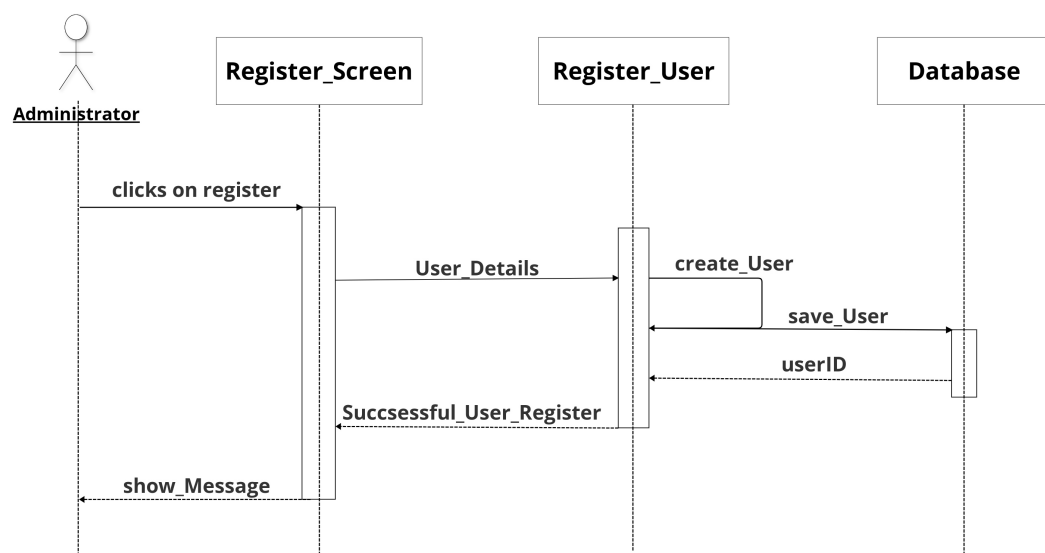

Table *Hr.Positions* gives information about the position of the current employee. If the employee has a registration in the system as a driver, manager, employee, etc., s/he gets that level of access that is assigned to the current role.
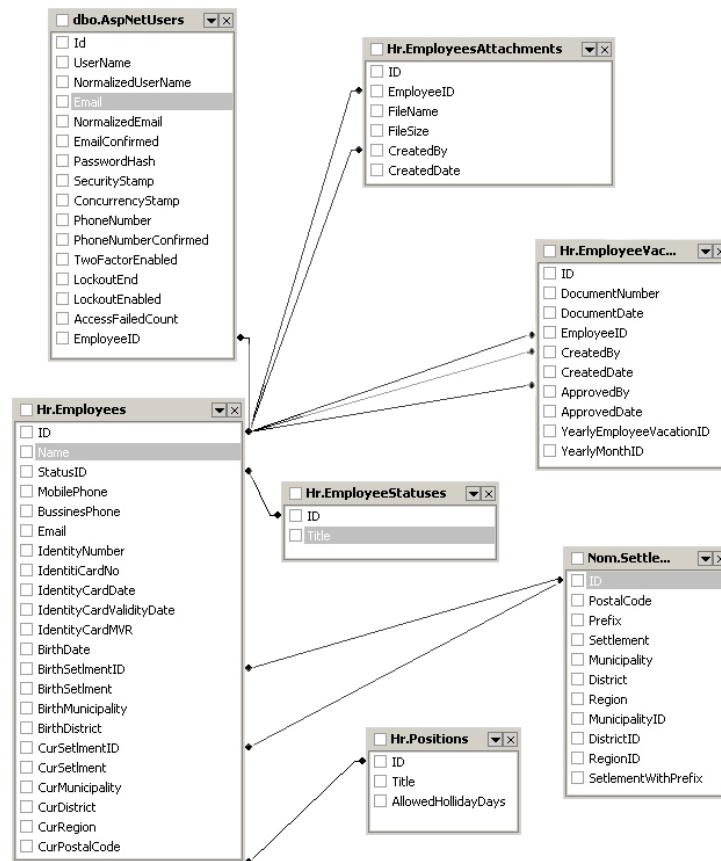
Figure 3. Relationships between tables dbo.AspNetUsers, Hr.Employees, Hr.EmployeeStatuses, and Hr.Positions

The relationships between the vehicle, vendor, and material listing tables are presented in Fig. 4.

The data, to be filled in table *Wh.VehicleItems* are concerning the listing of spare parts for the respective vehicle.
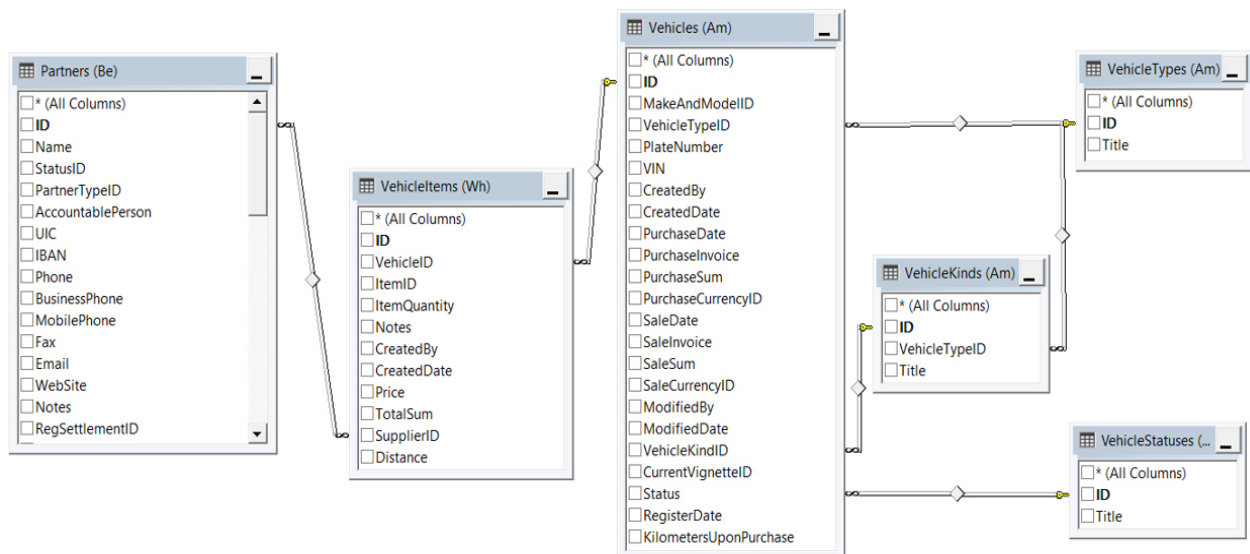

Figure 4. Schema of the relations between tables Vehicles, VehicleItems, and Partners

4. Structure of the System

The presented ERP system is designed for the overall management of a transport logistics company.

It consists of several separate modules, accessing a single relational database and connected with each other in order to quickly and timely track all activities in the company, for making up-to-date management decisions.

Base modules are *Human Resources*, *Accounting*, *Warehouse*, *Business Entity*, and *Assets Management*. Organized in this way, the ERP system is developed for the goals and needs of a specific company, and it is possible to set it up for any other customer, according to his activity.

The implementation of the system in practice is accompanied by integration with an automated system for managing commercial activity.

4.1. Brief Description of the Modules

Human Resources module – is used for employee management and administration. The basic functionality it offers is the keeping of a file for each employee – from the beginning to the termination of the legal relationship with the company, salary management, business trips, vacation, or sick leave. It can be foreseen that in a future version of the ERP system, it will also offer tracking of the specialized training of employees and their career development.

Accounting module – for managing the company's financial and accounting activities.

Warehouse module – for managing warehouse stocks – integration with the other modules is required for effective operation. It provides flexibility, convenience, and speed of work.

Business Entity module – it is designed to manage logistics connections between partners, customers, and suppliers. Access to it is regulated only for users who have key positions in the company to manage business assets.

GPS module – an important functionality that this module offers is the ability to track the activity of the company's means of transport in real time and by location. With the availability of GPS coordinates data, it is possible to track kilometers traveled, fuel consumed, tolls paid, working hours of employees associated with a specific vehicle.

Vehicles module – contains basic information about vehicles and the different types of vehicles used in the transport industry. Can be monitored: vehicle status, such as repair, scrapped, depreciated, technical data, tachograph data, fueling, and others.

A useful option in practice is to connect this module to the GPS module, but it is not mandatory. Companies prefer the combined use of the two modules, as it provides transparency in the management of work processes, an accurate view of their current status, as well as their real-time traceability.

For each of the mentioned modules, specialized user interface menus have been developed. The following is as a description of the main menus for accessing the functionalities of the individual modules of the ERP system.

4.2. Employees Menu

Successfully logging into the system, the user with administrative rights can edit the employee records through the menu '*Human Resources – Employees*'. The data that can be changed are name, surname, position, status, social security number, mobile phone, work phone, address data (town, municipality, district, and postal code, street), basic salary, and remarks. The sequence of the process is traced in the diagram of Fig. 5.

After editing the data, the 'Save' button is clicked. In case of wrongly entered data or omitted fields from the user, the system sends an error message to the user interface. With valid data, the system saves the new changes in the database and refers to the 'Human Resources – Employees' menu.
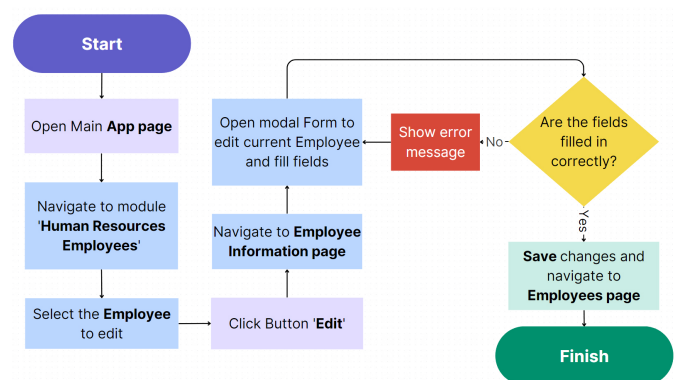

Figure 5. Employee registration process

4.3. Delivery Menu

When selecting the '*Delivery*' menu, two submenus are accessed – '*Deliveries*' and '*Delivery History*'.

The '*Deliveries*' submenu is intended for administrators. For each delivery, information is saved in the database and a counter number and date is automatically generated, which is initially current but can be edited later. Each delivery receives a system or fiscal voucher from the relevant fiscal unit, which are issued by an integrated automated system for managing commercial activity.

The core functionality of the procurement interface is for *Material Selection* and *Supplier Selection*.

In the *Material Selection* modal form, a drop-down list containing the items available in the warehouse is activated. The fields 'Brand' and 'Identifier' have been implemented to hold editable basic information. Additionally, the fields 'Quantity' and 'Price' have been included, with their values being variable and dependant on the consumption and financial situation in the market. It is possible to add both an existing and a new item to the warehouse.

Figure 6. Delivery interface

When selecting a supplier, the available suppliers stored in the database are visualized in a drop-down list and after selecting a relevant one, the information is saved in the delivery. In a situation where the requested provider is not present in the database, it can be added in a timely manner through a new record. For the convenience of users, an additional option for quick navigation has been implemented, in order to enter the next delivery.

When selecting the 'Delivery History' submenu, a table is displayed containing all existing deliveries by delivery number, date, supplier, type, made up, and the view is in descending order relative to the delivery date. The specific thing is that the 'Supplier' field includes a hyperlink through which the 'Supplier' data file can be accessed.

In the case of deliveries outside the borders of Bulgaria, the address is entered for the specified supplier and there is an opportunity to choose it when implementing the process. All deliveries made with the current supplier are visualized in a table.

They are sorted by date, in descending order and the 'Delivery Number' field has a hyperlink to view the delivery. Delivery number, the person who made them and the supplier, can search deliveries anywhere. Search options are available for the required fields.

4.4. Warehouse Menu

The main menu in the system consists of interfaces for 'Inventories', 'Nomenclature of materials', 'Returned materials', 'Claimed materials' and 'Withdrawn materials'.

The 'Nomenclature of materials' submenu provides functionality regarding the addition, editing or deletion of a spare part and can only be accessed by users with administrative rights. When adding a new material, a number is generated by the system for the material code, which is unique and sequential.

The generated code helps the further movement of the material in the system for search and verification.

Figure 7. Inventories interface

The *CreateItem* method is used to add a new item to the system. In Fig. 8 a part of the program code is presented.

The '*Returned Materials*' submenu provides the possibility to visualize all returned materials with return date, quantity, and material code. In the modal form of the return of a material, its quantity is written and the availability is reduced. Materials that are mis-delivered or in excess are returned to the supplier.

'*Claimed materials*' submenu includes the modal form containing data about the supplier, date of claim, and quantity. After a successful claim entry, the data are displayed in the 'Claimed Materials' interface. After supplier approval, the user can change the status of the claim from the button on the corresponding table and indicate it as approved. Materials that are delivered in a defective condition shall be claimed back to the supplier. The supplier must confirm this action after review of the claim.

```csharp
[HttpPost]
public JsonResult CreateItem([FromBody] Item item){
    var SequenceID = 4;
    var SequenceBarcodeID = 5; // Item Barcode
    var actionUpdate = 1;
    var context = new VMContext();
    string queryString = String.Format(CultureInfo.InvariantCulture,
        "dbo.spGetNextNumber {0}, {1}", SequenceID, actionUpdate);
    var docnumber = db.ExecuteQuery(queryString);
    string articlenumber = "";
    foreach (Dictionary<string, object> objects in docnumber){
        IEnumerable<object> values = objects.Select(x => x.Value);
        IEnumerable<string> keys = objects.Select(x => x.Key); // To get the keys.
        articlenumber = values.FirstOrDefault().ToString();
    }
    string queryBarCodeString = String.Format(CultureInfo.InvariantCulture,
        "dbo.spGetNextNumber {0}, {1}", SequenceBarcodeID, actionUpdate);
    var query = db.ExecuteQuery(queryBarCodeString);
    string BarCodeNumber = "";
    foreach (Dictionary<string, object> objects in query){
        IEnumerable<object> values = objects.Select(x => x.Value);
        IEnumerable<string> keys = objects.Select(x => x.Key); // To get the keys.
        BarCodeNumber = values.FirstOrDefault().ToString();
    }
    BarCodeNumber = 'I' + BarCodeNumber;
    item.Barcode = BarCodeNumber;
    item.Code = articlenumber;
    item.CreatedBy = ViewBag.EmployeeID;
    item.CreatedDate = DateTime.Now;

    db.Add(item);
    db.SaveChanges();

    return Json(new {success = true, responseText = "Successfully saving task!"})
}
```

Figure 8. The program code of a method for adding an item

'*Withdrawn materials*' submenu provides functionality regarding list of materials only by users with administrative rights and if there is an availability greater than 0. For each withdrawn material, there are data such as: code, material, vehicle, kilometers, supplier, price, quantity, and note. In the absence of availability, no functionality is provided for the selected material.

When writing spare parts, fill in what repairs have been carried out and maintenance data for the selected vehicle. After discharge, the stock in the warehouse is reduced. Using a search box, a specific table can be searched by the fields vehicle, material, and code. The included date and vendor filter is used to quickly view materials for a specific period and retrieve reports.

4.5. Menu 'Vehicle Data'

The '*Vehicle Data*' menu includes the overall information related to the vehicles. Submenus are available: *vehicles*, *vignettes*, *tachographs*, *technical inspections*, *sold vehicles*, *scrapped vehicles*, *expiring documents*.

For each vehicle entered into the system, information is provided regarding 'Registration number', 'Make/Model', 'VIN', 'Type', and 'Purpose'. Through the available search box, users have the opportunity to search for data on all columns. The functionality is available to add a new vehicle. Through the implemented hyperlink in 'Registration number', the user is redirected to the Vehicle Dossier. It is an interface with information about: brand and model, which are a nomenclature for the type of vehicles. Thus, when adding a new vehicle, the possible brands and models are visible as a list in relation to the specified type. It is possible to select the type of vehicle.

The field *Kilometers upon purchase* is intended for review and reference at the time of commissioning of the means of transport in the logistics company.

The *VIN number* field is a combination of symbols that conform to ISO (International Standard Organization) standards.

The *Initial Registration* field is a 'date picker' and provides the possibility to select from a calendar the date desired for the initial registration of the vehicle.

In the *Purchase amount* field, a numerical value is entered and information about the original price of the means of transport is saved.

'*Amount to sell*' is the field in which a numerical value is entered and the amount received from the sale of the vehicle is saved. Currency values are available, subject to editing if necessary.

Date picker field for *Purchase Date*. The difference between the two dates of registration and purchase is that upon initial purchase the vehicle may not be registered immediately. The reasons for this are different – e.g. repairs to be carried out before the vehicle is in working order or different plans for its future operation in the company's work process.

Upon purchase of the vehicle, an invoice for the purchase shall be issued. The invoice number can be entered into the system, as well as a pdf file with the document itself can be attached. The situation is similar for an invoice for the sale of the vehicle.

Data related to each vehicle in the system are also available in terms of: vignettes, tachographs, technical inspections, written materials, documents. All documents that are needed for travel in and out of the country can be attached to the system. These can be identity cards, driving licenses of different categories, passports, powers of attorney, and other types. The format of documents that can be attached is optional from the following: pdf, jpeg, img, or png.
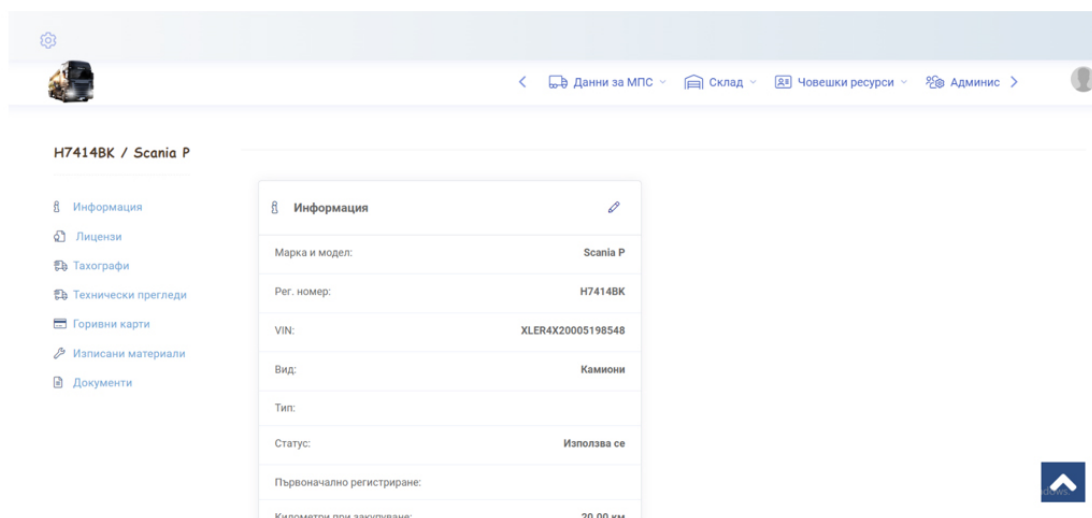

Figure 9. Vehicle Dossier interface

5. ERP System Testing and Evaluation

In the planning, design, and development of the ERP system described in this paper, leading principles from business informatics were implemented [3]. The ERP modularity principle is applied in the presented system. During the development of the software, the studied requirements in terms of the user interface were observed, a database model was defined, the business processes and logic related to the data management and services of the specific company were designed. This is of particular importance in the integration and implementation of the ERP system in a business environment and its reliable use.

5.1. Security of the System

The emphasis in developing the individual modules is on *system security* as one of the most important elements, achieved through data encryption and numerous situational simulations conducted to test and evaluate functionality.

Encrypting data after its initial entry is one of the steps that contributes to guaranteeing the integrity, availability, and accessibility of the contents of the database and the impossibility of direct access to it in case of possible external intervention. To protect information and documents, the following ConfigureServices method is used.

```
public void ConfigureServices
(IServiceCollection services)
  {
      services.AddDataProtection();
      services.AddTransient<ProtectorHelper>();
  }
```

5.2. System Testing

Numerous successful tests of the individual modules of the ERP system have been carried out under various types of scenarios. For each step of executing a successive test, users use the corresponding items from the navigation menu or buttons to implement the operations. Indicators of reliable functioning of the system are satisfied by test results for:

- Login successful,
- Login failed,
- Overview of availability,
- Material withdrawn successfully,
- Material withdrawn failed,
- Successfully added employees,
- Failed to add employees,
- Successful registration of an employee as a user in the system,
- Failed to register an employee as a user in the system,
- Successfully changed the password of a user in the system,
- Exit the system.

The test scenarios are valid for normal use of the system, as well as for possible incorrect actions by users.

SQL query tests were conducted on a large volume of data. When testing with large databases, it is possible that the system performance may be impaired, and it is easier to locate problems in the online system and fix them early in the development and implementation.

5.3. ERP System Evaluation

The criteria for overall evaluation of the presented system are speed, design, navigation in the system. The reporting scale has three levels – low, medium or high.

To evaluate the behavior of the developed system, the Gtmetrix platform was used, which reports results on several indicators of the performance of the application at initial loading. The results are presented in Fig. 10.
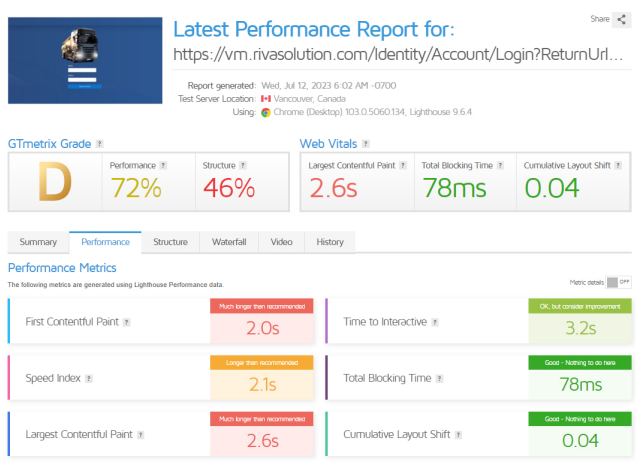

Figure 10. System speed test

Developed and implemented in companies are not only desktop ERP systems used by employees via desktops and laptops are successfully, but also ERP systems with web and mobile access, with the ability to use mobile devices [17]. Nowadays, leading companies in various industries and businesses use such software products. This is an indicator of the rational planning of resources in terms of costs and investments of companies, for better management of their activities and better service to their customers [18].

6. Conclusion

This paper presents a developed and functioning ERP system for managing warehouse logistics of small and medium-sized companies. The advantages of the system are the easy-to-use navigation, easy and quick access to the activities of the various company departments, support for the management team in making decisions, as well as obtaining timely information in real time about the processes in the companies that use it.

The system has a responsive design, and the design and implementation of a mobile application with similar functionality would contribute to a better user experience for customers and its promotion. At a later stage, the system will be modified to meet the specific needs of another large company in Bulgaria. The purpose of the article is to present the peculiarities of the database design process and the main modules of the system, so that they are versatile enough, but at the same time specific, to satisfy the explicit requirements of a particular client.

The main thesis of this paper also aims to uncover the role of software innovation in the use of data, its aggregation and distribution among the employees of the company in real time. Not only the final positive result achieved by the innovation is of importance, but also the simplified and facilitated work in the logistics department of the organization.

In the future, it is planned to add functionalities for the full integration of a GPS system and its interaction with all existing real-time modules, as well as support for foreign languages.

References:

[1]. Selamoglu, B. I. (2023). *MRP and ERP*. CRC Press eBooks. Doi: 10.1201/9781003180302-10

[2]. Varbanova, S., Bikov, D., Jovanovska, V. A., & Krstev, A. (2013). Costs and investments of information systems in small & medium enterprises. *Jubilee International Scientific Conference '50 years of the St. Cyril and St. Methodius University of Veliko Tarnovo', Section Faculty of Mathematics and Informatics*.

[3]. Zabukovšek, S.S., Tominc, P., Bobek, S. (2020). Business Informatics Principles. In Pászto, V., Jürgens, C., Tominc, P., Burian, J. (Eds.) *Spationomy*. Springer, Cham, Switzerland.
Doi: 10.1007/978-3-030-26626-4_4

[4]. *ERP Full Form | What is Enterprise Resource Planning - javatpoin*t. (n.d.). Javatpoint.
Retrieved from:
https://www.javatpoint.com/erp-full-form
[accessed: 10 June 2023].

[5]. Katuu, S. (2020). Enterprise Resource Planning: Past, Present, and Future. *New Review of Information Networking, 25*(1), 37-46.

[6]. Wan, X. Y., & Xu, G. Q. (2012). Application Research of Pharmaceutical Industry Management System Based on ERP and CRM Integration. *Applied Mechanics and Materials*, *101*, 55-59.
Doi: 10.4028/www.scientific.net/amm.101-102.55

[7]. Bhattacharya, M., Ramakrishnan, T., & Wamba, S. F. (2023). Leveraging ERP systems for improving ERP effectiveness in emergency service organizations: an empirical study. *Business Process Management Journal, 29*(3), 710–736.
Doi: 10.1108/bpmj-06-2022-0303

[8]. Aslan, B., Stevenson, M., & Hendry, L. C. (2012). Enterprise resource planning systems: An assessment of applicability to make-to-order companies. *Computers in Industry*, *63*(7), 692-705.

[9]. Herlyn, W. J. (2021). Application-Architecture of an ERP-System for the era of Industry 4.0. INFORMATIK 2021. *P314 - INFORMATIK 2021 - Computer Science & Sustainability*.
Doi: 10.18420/informatik2021-109.

[10]. Mularczyk, R., Kucharska, E., Grobler-Dębska, K., & Baranowski, J. (2022, August). Integration of Data Analytics in Operation of Enterprise Resource Planning Systems. In *2022 26th International Conference on Methods and Models in Automation and Robotics (MMAR)*, 35-40. IEEE.
Doi: 10.1109/mmar55195.2022.9874332

[11]. Bronner-Etelin, A., & Zaraté, P. (2021, May). ERP and Time Management: A recommender system. In *7th International Conference on Cognitive Decision Support Systems and Technologies (ICDSST 2021)*, *414*.

[12]. Bawack, R. E., & Kala Kamdjoug, J. R. (2023). Managing client–consultant relationships to derive benefits from ERP projects. *Information Technology & People*, *36*(4), 1669-1702.
Doi: 10.1108/itp-07-2021-0573

[13]. Hammer, M. (2014). What is business process management?. In *Handbook on business process management 1: Introduction, methods, and information systems* (pp. 3-16). Berlin, Heidelberg: Springer Berlin Heidelberg.

[14]. Maldonado, C., Pinos, P., Crespo-Martinez, E., Astudillo-Rodriguez, C., Vasquez-Aguilera, A., & Chica-Contreras, G. (2021). ERP System inventories module implementation Procedure. *Proceedings of the International Conference on Industrial Engineering and Operations Management,* Bangalore, India.

[15]. Shiau, W. L., Hsu, P. Y., & Wang, J. Z. (2009). Development of measures to assess the ERP adoption of small and medium enterprises. *Journal of Enterprise Information Management*, *22*(1/2), 99-118.

[16]. Tarik, Z., Muharem, K., & Tarik, M. (2020). ERP Solution and End-user Efficiency in Bosnia and Herzegovina. *TEM Journal*, *9*(4), 1562.
Doi: 10.18421/tem94-31

[17]. Vasilev, J., & Kehayova-Stoycheva, M. (2019). Sales Management by Providing Mobile Access to a Desktop Enterprise Resource Planning System. *TEM Journal*, *8*(4), 1107. Doi: 10.18421/tem84-01

[18]. Tavana, M., Hajipour, V., & Oveisi, S. (2020). IoT-based Enterprise Resource Planning: Challenges, Open Issues, Applications, Architecture, and Future Research Directions. *Internet of Things, 11*, 100262.
Doi: 10.1016/j.iot.2020.100262